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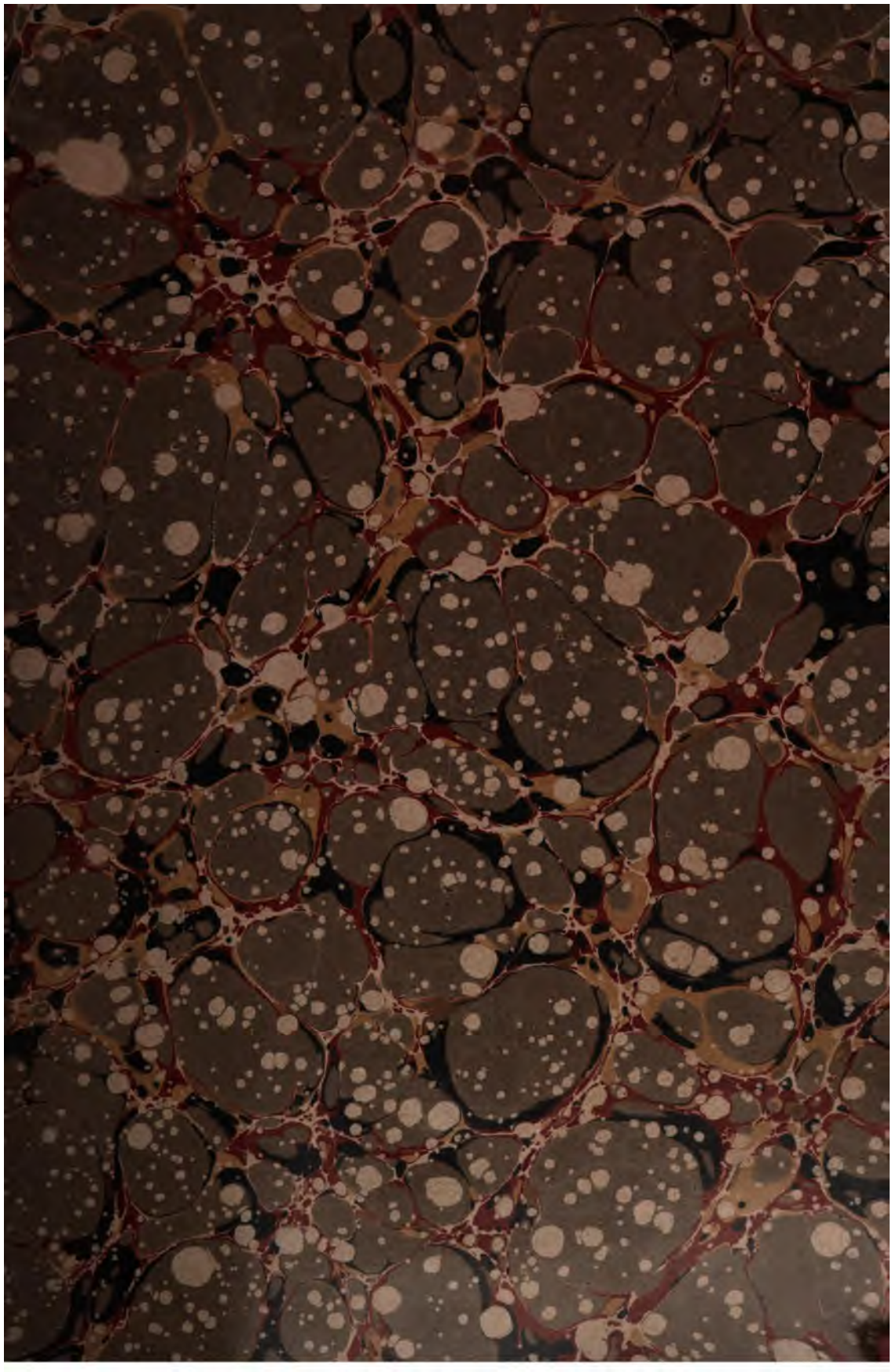

The JOURNAL *of* GEOGRAPHY

A Monthly Magazine Devoted to the Interests of Teachers of Geography in Elementary, Secondary and Normal Schools

Ray Hughes Whitbeck, Editor
Lawrence Martin, Associate Editor
Of the Department of Geology and Geography,
University of Wisconsin

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VOLUME XIII
1914-1915

APPLETON, WIS.
THE POST PUBLISHING CO.
1915

Entered at the Post Office, Madison, Wis., as second-class mail matter Sept. 9, 1910

The Journal of Geography

Published Monthly except July and August

Successor to the Journal of School Geography, Vol. V, and the Bulletin of the American Bureau of Geography, Vol. II.

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Rules of Publication

PRICE—The subscription price is one dollar a year, payable in advance. Fifteen cents a copy.

POSTAGE IS PREPAID by the publisher for all subscriptions in the United States, Hawaiian Islands, Philippine Islands, Guam, Porto Rico, Tutuila, Samoa, Canada and Mexico. For all other countries in the Universal Postal Union add forty cents for postage.

CHANGE OF ADDRESS—When a change of address is ordered, both the new and the old addresses must be given. The notice should be sent ten days before the change is to take effect. Subscribers who fail to give notice of change are responsible for payment for all copies sent until notice is received. The post-offices do not forward second-class mail matter. Subscribers who do not observe this rule will not be sent duplicate copies.

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HOW TO REMIT—Remittance should be sent by Check, Draft, Express Order, or Money Order, payable to order of The Journal of Geography. It is, as a rule, safe to send a dollar bill without registering, but sender must assume the risk. Larger amounts should not be sent in cash.

THE JOURNAL OF GEOGRAPHY

V. C. FINCH, Business Manager

University of Wisconsin, Madison, Wis.

231060

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The JOURNAL of GEOGRAPHY

VOLUME XIII SEPTEMBER 1914. NUMBER 1

GEOGRAPHY IN CITY HIGH SCHOOLS *

By R. H. Whitbeck,
University of Wisconsin, Madison

WHAT is the present situation in this country with respect to geography in the high schools?

1. Ninety per cent of the students who enter normal schools and colleges are deficient even in the elements of general geography, a condition which has no adequate defense.

2. The physical geography of the high school does little to improve this condition so far as a knowledge of general geography is concerned.

3. Geography is discontinued too soon in the grades. St. Louis, for example, reports that only 4.8 per cent of the recitation hours of its elementary schools is given to geography.

4. The physical geography of the past generation has not proved wholly satisfactory, and is being replaced by the so-called humanized geography. It is feeling the effect of the socializing of the curriculum.

On the other side of the situation appear the following facts:

1. Geography as a college study is developing rapidly, and trained teachers for the high schools are becoming available, a condition which has only lately existed.

2. There is a growing interest in geography among educated people generally both evidenced by, and helped by, the great circulation of the National Geographic Magazine and shown by the increase in geographical societies, and their activities.

3. Textbooks in humanized geography have already been issued and have been heartily received, and there is a demand for even a further emphasis upon applied geography in high school texts.

4. The geographical element in other branches of learning is receiving increased recognition. For example, the U. S. Department of Agriculture has trained geographers at work on the preparation of an Agricultural Atlas of the United States. The Carnegie Foundation has historians and geographers at work on an Atlas of American History. The Geological Surveys of Wisconsin, Illinois, and some other states are issuing geographical as well as geological reports, especially for educational use.

*Read before the Science section of the National Education Association at St. Paul, July 7, 1914.

5. Geographical knowledge is an essential part of an education and upon its own merits will command and hold a place in the schools. But behind any study there must be an organized body of teachers to guide its development and maintain an *esprit de corps*. The conviction is growing that there must be a national organization of geography teachers as there is of history teachers, English teachers, Latin teachers, etc.

Geography An Integral Part of a High School Course

But why is geography an integral part of a high school education?

American History, Ancient History, Mediaeval History, Modern History are all taught and believed in. These are records of what peoples and nations did yesterday and the day before. But is a knowledge of Germany of the 16th century more valuable than a knowledge of Germany of the 20th century? Any study of nations and peoples which omits their study as they are today is manifestly dictated by tradition, not by the needs of people. History is one of the most broadening studies in the curriculum, but there is no defense for ending the study of countries with the 19th century. To him who would be an intelligent actor in the world's affairs today, the political and economic geography of today is one of the most practical of studies.

Four Aims of High School Geography

There are at least four things which must be accomplished by a high school course in geography. First, it must give the pupil a fund of useful geographical knowledge; the kind that will serve him in the various activities of life where intelligent citizenship is required. We shall find it difficult to defend the teaching of the causes of the Peloponnesian War, the details of the Amphictyonic Council, and scores of similar matters of ancient and mediaeval history, which we drill into school children, while, at the same time we excuse a school which makes no serious effort to give its pupils an understanding of *modern* Germany, Japan, or Argentina. The life and industries of the people of Babylon and Thebes is a proper subject of study, but it is not a substitute for a knowledge of modern Mexico, Canada, or Russia. Before an impartial jury what defense has the study of the 2000-year old struggle between Sparta and Athens or between Persia and Greece, for crowding out of our schools anything like an adequate treatment of the countries which dominate the world today? The geography which is going to be demanded tomorrow is the geography which makes people reasonably intelligent about the cities and countries and peoples of their own day, as well as of those of long ago. This is politico-economic geography. It is a social science, but it will, I hope, be built upon a knowledge of the principles of physical geography. In Germany, France, Holland, Austria, Switzerland and Scandinavia, geography is nearly always closely affiliated with history and is often taught by the same teacher.

(2) If the first requirement placed upon the study of geography is a knowledge of the facts about the peoples and nations of today, a second is acquainting students with standard sources from which such facts may be gleaned. The text book is normally the main source of the facts studied in the class, but that is not enough. We shall miss our duty if we do not teach pupils where these and additional facts, frequently revised, may be found. The course in geography should train the pupils to use the atlas, the encyclopedia, the gazetteer, the Statistical Abstract, the census reports, the Statesman's Year Book, and perhaps the World Almanac. If these sources are consulted in the regular routine of study, their use grows into a habit, and it is a good habit.

(3) The constant use of maps, the careful study of maps, and the occasional making of maps is an integral part of a course in geography. One of the very most valuable assets which any one may derive from geography study is a collection of clear mental pictures of the maps of the world and its principal countries; mental map pictures which we may call up at will. If geography does not give us those pictures it has failed at one of its critical points.

Geography teachers, if you have not a collection of wall maps for your class room, give your principal no peace until you get them. As well try to teach literature without books as geography without wall maps. There is one greater sin than not having wall maps; that is not using them when you have them. Out of this map-study grows a knowledge of locational geography. At present locational geography is a vulnerable spot in the high school student's mental equipment. Yet there is probably no one phase of geography which is so useful as map knowledge,—knowing where places are. That our fathers and mothers had to learn 300 capes and bays, is scarcely a reason why their grandchildren should not learn any. Every geography teacher should have a list of countries, cities, rivers, seas, mountains and other geographical features which she deems of real importance, and she should then see that no pupil escapes from her custody until he knows where those places are and at least one good reason why every item in the list deserves a place there. The Springfield, Illinois, schools have adopted such a list for the grades. Professor D. C. Ridgley of the Normal University of Illinois is working on such a list. The Springfield list was published in the June, 1914, Journal of Geography.

(4) So much for the knowledge of facts, of sources, and of maps. A fourth purpose must be to impart a knowledge of and an appreciation of geographical causes or influences. This is the substance of rational geography. It has appeared so constantly of late in the literature of geographical pedagogy that I need say little more about it. The causal idea is recognized as the keynote of modern scientific geography, but its emphasis belongs more to the advanced than in the elementary stages of the study. Woven into the

very warp and woof of good teaching will be this causal relation which pervades geography; yet it is also well to remember that geographical causes always work in conjunction with many other causes. The location and growth of New York or Minneapolis are due partly, not wholly, to geographical influences. Pupils should know that geographical influences are real, and that they often determine men's decisions in locating factories or railways or towns, but that after all, men, not geographical influences, are the active forces. Indians and Eskimos do not react to geographical suggestions as Anglo-Saxons do.

In What Year Shall Geography Be Taught?

If we were to lay out a course of study in geography for a large high school, upon what lines should it be built? In what year of the high school should it be placed? At present it is most often taught in the first year. Next most frequently, in the second year and less often in the third or fourth year. The Committee of Ten favored placing physiography of an advanced type in the fourth year, because the study is best handled after pupils have learned something of the other sciences. We should like to place most of our studies late in the course, but that is impossible. As a practical plan, geography must be offered in the first or second years, but it would be a fine thing if in the big schools a class might also be offered in the senior year, taught by a teacher trained in geography, in history and in economics, one who could effectively handle the study as a blended physical and social science.

The Course In High School Geography

In this country we are already committed to a type of geography which is a combination of physical and applied geography. Geographers are practically agreed that the first half year of the course must teach the essentials of physical geography. They are not a unit, however, regarding the most appropriate phase of applied geography for the second half year. Of the two most recent text books, one has adopted regional geography of the world for the second half-year's work; the other devotes its latter chapters to such topics as: Inland Waters as Related to Navigation, Irrigation, Power and Water Supply; Mountains and Plateaus and their Relations to Life; Plains and their Relations to Life; Coast Lines and Harbors; The Industries of the United States; Distribution of Population and Cities. A still different arrangement consists in using a textbook in physical geography the first semester and a textbook in commercial geography the second.

While not *strongly* favoring one of these plans above another, I am conscious of a preference in the matter. It may be only a temporary preference but it has been growing upon me. My leaning is toward a course which combines some things from each of the plans just mentioned. I cannot get away from the conviction that the high school pupil ought to have an opportunity to study, in a more mature way than he can do in the grades, the poli-

tico-economic geography of the nations which today dominate the world's affairs. In a sense this is regional geography, but the regions to be studied are nations, rather than physical or climatic provinces. The physical or climatic province is possibly a more logical, more scientific, unit but it is not much used outside of school books. In the world of men and affairs Russia, for example is a single geographical unit, Germany another, and France another. Everybody thinks of them as units quite irrespective of the climatic or physiographic provinces which they may include or which may include them. Everywhere in real life, the political divisions are the ones that count in our thinking, our reading and our loyalty. Virginia includes parts of several physiographic provinces—the Coastal Plain, the Piedmont, the Blue Ridge, the Great Valley, and the Allegheny Plateau, yet to the Virginian, the thing that counts is Virginia, his state. The Canadian or the Mexican boundary line and most of our state lines are more significant boundaries than are the boundaries of the Coastal Plain or of the Great Basin or of any other physiographic or climatic provinces. In regional geography, the study of the political divisions of the world is at the present time my preference. This does not preclude the recognition and the study of natural divisions quite irrespective of political boundaries. He who prefers a different plan has the same right to his preference.

Details of the Course

Had I Aladdin's lamp and its power to summon up the Genii, this is, in general plan, the sort of course I think I should command him to prepare for a class in geography in the city high school (I reserve the privilege of changing my mind, however). It should provide for a map-study review of the essentials of the locational geography of the world. It should devote from 1/3 to 2/5 of its time to those parts of physical geography which time has shown to be of real interest and of practical value. Geography is by common consent not the study of the physical and untenanted earth nor is it the study of contemporary history; it is the study of the physical earth inhabited by people. The text book should contain problems calling for thought, questions for testing, and questions for review. The great majority of teachers who use our high school texts are not trained in geography; many of them have never studied it beyond its elementary phases, and they need all of the help the book can give them. I never knew a teacher who felt insulted because the author placed questions in the book. Reviewers sometimes say they are an insult to the teacher. The experienced teacher need not use them unless she wishes. They do her no harm and they do help the other teachers. There should be some sort of practical exercise or laboratory exercise, in every chapter if possible. There should be a section devoted to the Industrial Geography of the United States and the final two-fifths of the book should treat of the countries, the nations of the world, working under the limitations imposed by their physical environment, and actuated at least in the present age, mainly by economic motives.

Geography, then, in its modern sense ought to consist of (a) a study of the essentials of physical geography and the physical conditions and resources of those parts of the globe which the leading nations occupy; (b) the geographical study of mankind acting as organized political groups or nations; (c) the interaction of the people and their environment—the nations working for political and economic advancement, but mainly concerned with the development of industries and commerce.

Topics In Physical Geography That Deserve Emphasis

For the sake of definiteness, it is undoubtedly better to study the main principles of physical geography in the first semester. Pupils need to understand:

(1) The simpler planetary relations of the earth including dimensions, movements and their consequences, gravity, magnetism and the distribution of land and water on the earth.

(2) They need to understand in an elementary way the character and composition of the earth's crust—the two main origins of its rocks and the mineral resources contained within these rocks. They ought to know something of the underground processes by which iron, coal, copper, gold, salt and petroleum have been concentrated in places and thereby have become of value to man.

(3) They should know how weathering is accomplished, how soil is made, transported, enriched, and depleted, including the work of bacteria. Along with this must go a brief consideration of the great industry of agriculture.

(4) They should learn of the movements and functions of the underground water,—vastly more important to man than any other resource in the earth's crust except the soil itself, and the two so interlocked in function that each is useless without the other.

(5) They need to know how the earth's surface is eternally modified by forces acting within and without. The forces which modify the earth from within—forces burdened with the discouraging names of Diastrophism and Vulcanism, need only brief treatment. The eroding, transporting and depositing agents,—wind, water, and ice, need, fuller consideration. Growing out of this topic naturally comes the study of rivers and valleys in their varied relations to man; their relation to transportation, to water power, to agriculture, to location of cities, etc. In the study of rivers concreteness should be sought: study, not rivers in general, but specific, typical rivers: for example:

The Nile and Egypt
The Ganges and India
The Yangtse and China
The Amazon and Brazil
The St. Lawrence and Canada
The Volga and Russia
The Danube and Austria-Hungary.

So closely are these rivers related to the very life of these lands, that their study is geography in the best sense.

(6) Then must come some knowledge of the great land forms that have resulted from the operation of these geologic and physiographic forces: The mountains, the plateaus, the plains, with the emphasis strongly placed, not upon the physiographic but upon the ontographic side.

(7) The atmosphere and climate are entitled to a fifth or a fourth of the time of one semester, some teachers would say even more.

(8) The oceans merit less time than either the lands or the atmosphere. The tides can not be adequately taught in the high school and it is doubtful if any attempt at their explanation is really justified except by tradition. Ocean currents are deserving of attention chiefly in connection with climate and for the purpose of correcting some of the false ideas that are frequently taught in the elementary school.

(9) The distribution of plants, animals and races over the earth has always seemed to me to be perfunctorily taught and of no great value.

It is my conviction that in nearly every topic, physical and applied geography should go hand in hand. For example, weathering, soil, and agriculture go together; or stream erosion, valleys and life in valleys; all of which are so closely related that they ought to be considered together. While the principles of physical geography form the groundwork of the first semester's study, constant application of these principles to man's life on the earth is also demanded.

Consideration of Method of Teaching

But what of the method of teaching high school geography?

Some years ago when we were teaching only the physical aspect of the subject we classed geography with physics, chemistry and biology and regarded it as a laboratory science. Laboratory manuals were published and in a considerable number of large cities, school buildings were equipped with geographical laboratories. In the relatively few schools which had teachers prepared to carry on formal laboratory work, a reasonable degree of success was attained. But the movement did not gain headway and seems to have lost ground with the growth of the demand for humanized geography. Laboratory work in college geography is, on the other hand, increasing in its effectiveness. Friends of physical geography have always held that it is essentially a field study and that the laboratory is a very unsatisfactory substitute for the field. Geikie has said that one hour of instruction in the field is worth 20 hours of listening to lectures. His ratio of 20 to 1 is pretty high but the general principle no one can deny.

We all recognize how hard it is to do field work with city classes. There are a dozen genuine difficulties, yet field work can be done and is done. Not long ago John Mellish, a farmer boy in Cottage Grove, Wisconsin, wanted to study astronomy. He had had little schooling, had no

telescope and no observatory. Yet under difficult conditions he acquired the knowledge, he actually made a highly effective telescope, grinding the lens himself, and with it made discoveries of such importance that they brought him in one year two American medals and one foreign medal; which merely suggests that difficulties are designed to deter the timid and half-hearted, but not the resolute.

With the increasing emphasis which is now being placed upon geography as a social science, there is a decline in the demand for formal laboratory and field work. This does not mean that practical exercises, problems, map work, drawing and platting are not an essential part of humanized geography, for they most emphatically are.

In addition to the preparation of text book assignments, each pupil ought to work out with care two or three special topics; this is a work which not only acquaints him with sources where materials are to be found, but it gives him training in the organization and presentation of topics, a training which often proves more beneficial than the knowledge itself. This independent, constructive work ought not be omitted.

SUMMARIZING—

This paper is a plea for a full year of geography in the high school, taught as a combined physical and social science, taught by a teacher who has a knowledge of modern history and economics and a considerable knowledge of the earth sciences. It is a plea for work in sane physical geography with field studies, followed by a study of regional geography in which the regional units studied are the ones recognized in the bigger world beyond the school room, namely, the countries or nations which make up the modern world and in which all educated people are interested; a study of the politico-economic geography of the British Empire; the German, the Russian, and the Japanese Empires; of France, and China, Italy, and Austria, and our sister republics to the south; a study of their material resources, of their industries and institutions, their people, their cities, their political alliances, and the basic reasons which make them what they are in the family of nations; this with much use of maps, with an emphasis upon locational geography with training in the use of reference books, training in the preparation and presentation of topics, and a constant drill on essential principles and ideas. But all of it to be done in an elementary way befitting the youth of the pupils. This outline may sound like a post-graduate course in a university and such it might be, for geography, like history, is either an elementary or an advanced study, depending upon the manner of treatment.

France produces more potatoes than all North America, and Germany produces more than all of the world outside of Europe. Forty per cent of the German crop is fed to stock, and only 28 per cent is used for human food.

CRATER LAKE

By James F. Chamberlain
State Normal School, Los Angeles, Calif.

OF the many wonderful scenic features of our country, few are more interesting or more beautiful than Crater Lake. In addition to its great beauty, the lake enjoys the distinction of being the only one of its kind in the United States and of being the deepest lake within our borders.

In 1853 Crater Lake was discovered. Thirty years later the United States Geological Survey sent out the first party to study it. A considerable area, including the lake, was created a national park in 1902. Owing to its distance from a railroad, the lake has not, until quite recently, been visited by many people.

Crater Lake is situated about 65 miles north of the northern boundary of California and is in the midst of the beautiful Cascade Mountains in the southern part of Oregon. Intending visitors to Crater Lake, if starting on their trip from points in California, should leave the main line of the Southern Pacific Railroad at Weed, California, and proceed by a branch line to the city of Klamath Falls which is very picturesquely situated upon hills at the head of Lake Ewanna, about 15 miles from Lower Klamath Lake. In the vicinity of Lower Klamath and Tule Lakes we see thousands of acres of reclaimed swamp lands which form a part of the Klamath Project.

A bus ride of about fifteen minutes' duration lands passengers at the lower end of Upper Klamath Lake. After a most interesting boat trip of some three hours, the famous Pelican Lodge is reached. This is located on Pelican Bay, at the upper or northern end of the lake. In many places the mountains rise abruptly from the water and are fairly well wooded. Lava flows are seen at several points. To the west the sharp summit of Mount Pitt is plainly visible. Great white pelicans with their black-tipped wings are numerous and trout leap from the water at frequent intervals as the boat proceeds.

From Pelican Bay Lodge automobiles run directly to the rim of Crater Lake by way of Fort Klamath. The distance is about 40 miles. Much of the country in this vicinity is a very fertile plain which is in part due to the constructive work of glaciers and to deposits made by Anna Creek, Sun Creek, and Williamson River. These streams flow into Klamath Lake. Many of the farmers are Indians who live in quite substantial houses. In the early autumn whole families take up their abode in the huckleberry districts, camping there and gathering the fruit for winter use.

From Fort Klamath the road runs northwest to Crater Lake, a distance of about 20 miles. A few miles out of the town we enter a beautiful forest which continues to the end of our journey. The road swings in graceful curves among the stately firs and pines and at every turn some new beauty is presented. Here a grouse whirs from the cover of the roadside bushes

and flattens himself upon the limb of a tree. There a gaudy flicker wings his way to a new feeding place high up in a yellow pine. A company of magpies occupy a small open space. With their long black tails, black heads and white breasts, they are quite attractive. About half way between Fort Klamath and the rim of the lake we enter Crater Lake National Park. At the most favorable places within the park a speed of 15 miles per hour is permitted. Drivers of automobiles must give all other vehicles the right of way.

For several miles the road follows close to the rim of Anna Creek Canyon. This is a narrow canyon several hundred feet in depth. By walking a few rods from the auto, very impressive views of erosion columns can be had at a number of points.

Although there is a steady climb, the grades are not steep until we reach a point about three-fourths of a mile from the rim. In most cases automobiles go right to the summit, however. As we swing up on to the rim a most wonderful sight meets out gaze. Here, on the top of an immense truncated mountain, is a great bowl-like depression about five miles in diameter, holding a lake of marvelous blue. The walls of this circular depression are nearly vertical and rise above the water to altitudes varying from 500 to 2200 feet.

Nearly due north of us and about two miles distant, is a small conical island wooded to its summit. Its form at once claims our attention for it is strongly suggestive that the mountain is of volcanic origin. Here and there along the rim of the lake a peak or cliff rises above the general level. Llao Rock on the north, Glacier Peak and the Watchman on the west, on the south, Garfield Park, Vidae Cliff and Dutton Cliff and on the east, Cloudcap, are each a little more than 8000 feet in altitude.

No river flows into Crater Lake and there is no surface outlet. The source of the water is the precipitation that takes place over the 20 square miles which make up the surface of the lake and the small amount derived from the inner face of the rim. Considerable water escapes through the shell that surrounds the lake and some of this comes to the surface in the form of copious springs in the vicinity of Fort Klamath.

The outer slope of the rim is quite moderate, averaging from ten to fifteen degrees. The inner slope, as has been stated, is in most places practically vertical. From the lodge on the rim of the lake, a steep trail leads down to the water, the elevation of which is 6177 feet, or only sixteen feet less than the altitude of the summit of Mount Washington. The descent can be made in twenty minutes but twice this length of time should be allowed for the return trip. Only a few miniature beaches are found. At the foot of the trail some tiny rills deposit their loads of waste when it rains and when snow is melting and here is space for a small launch and two or three row boats.

A pull of thirty minutes will take one by row boat to Wizard Island,

the cone above referred to. As we row, the blue of the water is a constant marvel to us. The clearness of the water is remarkable also, being equal to that of Lake Tahoe. If we were to take the soundings, the depth of the water would be another source of surprise. If at any one of many points in the lake the highest building in New York City were placed and upon this the Eiffel Tower were erected, the top of the tower would be about 200 feet below the surface of the water. Few of the soundings taken have shown a depth of less than 1000 feet, eighteen show a depth of more than 1900 feet and the maximum depth recorded is 1996 feet. Thus the greatest depth from the rim to the bottom of the lake is practically 4000 feet.

Observations of temperature have shown that the temperature of the water decreases to a depth of 300 feet. From this level to the bottom, the temperature is uniformly 39°F.

Landing upon Wizard Island we find that the waves lap against a lava flow that encircles the island. The slope of this is most gentle on the west. The soundings show that the only shallow part of the lake surrounds the island and therefore it is likely that the flow of lava is responsible for the shallowness of the water. Clambering over the blocks of lava we soon reach a steeper slope which is largely composed of cinders. The climb to the summit gives one considerable exercise as no definite trail can be maintained in the loose materials. That two or three centuries at least have elapsed since the firey flood poured down the slopes of this volcano, is evidenced by the forest trees now growing here.

Wizard Island rises 763 feet above the level of the lake. The climb to the summit can be made in half an hour although a longer time should be taken. From the top we look down into a gloomy pit, the crater of the volcano. It is about 150 feet in depth. The descent can easily be made. Most of the surface is cinder covered. At the bottom is a basin-like depression perhaps twelve feet in diameter. There is no vent of any kind to be seen.

What was the origin of the basin that holds beautiful Crater Lake? The mountain in the top of which the lake is situated, is clearly an old volcano. The basin was formed by a blowing out of the top of the mountain or by a subsidence. Many years ago Diller pointed out that had the basin originated in the first of these ways, the rim would of necessity be covered by a vast quantity of the fragmental materials ejected. From our boat we observe that this is not the case. Instead, we see sheets of lava dipping outward and some glacial material.

It seems that this basin, or caldera, was formed through subsidence. About fourteen cubic miles of material would be required to fill the caldera. How many additional cubic miles were engulfed is not known, for the height of the majestic mountain that once towered above the present lake can not with certainty be stated. As the lava that poured out here is similar to that which has issued from Mount Shasta, and as the diameter

of Mount Shasta and that of the caldera are essentially the same at the level of 8000 feet, geologists believe that the partially destroyed mountain rose to an altitude of about 15,000 feet.

That a lofty mountain *did* exist here is shown by the glacial striae upon the rocks even at the crest of the rim and by the glacial material on the lower slopes and in the valleys. Unless a mountain once towered above the basin now occupied by the lake, there would be no means of accounting for these. Even were the rim above the snow line, which it is not, a glacier could not form at the very edge of the rim.

Additional evidence of the existence of a lofty mountain is found in the valleys of Sand and Sun Creeks which extend to the rim, forming depressions in the cliffs although their streams begin some little distance below the cliffs. These valleys were formed by ice and water coming from a much higher level. To this partially vanished mountain the name of Mount Mazama has been given. It is believed that Wizard Island and one or two volcanoes that do not rise above the level of the lake, were formed after the engulfment of the mountain.

For the accommodation of visitors at the lake there are comfortable tents with board floors and a large dining room which serves as an assembly room also. The rates are $3.25 per day. A commodious stone hotel, which will no doubt be open in 1915, is now being erected upon the rim. The government is constructing a splendid road through the national park and this will make this part of the trip easier than it is at the present time. The entire trip from Klamath Falls to the lake can be made in one day.

Visitors going to Crater Lake from points north of the California line can leave the Southern Pacific at Medford or Ashland, Oregon. From Medford a road follows the picturesque valley of the Rogue River and enters the national park by what is called the West Entrance. During the tourist season, June 15 to September 30, there is a daily auto service from Medford. Each year Crater Lake is being visited by a larger number of persons and all who see it agree that it is one of the wonders of our country.

Ginn and Company have recently brought out the second in their series of *Industrial Studies* by Nellie B. Allen of the Fitchburg, Mass., State Normal School. A volume of 335 pages devoted to *Industrial Studies, United States,* appeared in 1910. The new volume is devoted to Europe. These books are more than supplementary readers; they contain maps, topics for study, lists of geographical names for practice in spelling and pronunciation, and many good illustrations. It is clear that the different "studies" are chosen by a person who understands what children are interested in,—for example, "Portugal and its Cork Forests," "Germany and her Toys and Canaries," "Spain and Olives."

THE DIAMOND MINES OF SOUTH AFRICA *

THE famous diamond mines of South Africa are in the neighborhood of Kimberly, De Beers, Dutoitspan, and Wesselton. Kimberly is practically in the center of the present diamond-producing area. Besides these mines others of some importance in the Orange River Colony are known as Jaggersfontein and Koffyfontein, Lace, and Monastery, besides two new mines, the Roberts-Victor and the Voorspoed.

The areas of the mines are:

Kimberley	33 acres
De Beers	22 acres
Dutoitspan	45 acres
Bultfontein	36 acres

In 1907 the total number of carats raised from these mines was more than two million and a half, the sales of which realized over $30,000,000.

The most important mine outside the Kimberley group is the new Premier Mine, about 20 miles West-North-West of Pretoria, where the famous Cullinan diamond was found.

The Pipes or Craters

The five diamond mines or craters are all contained in a circle 3½ miles in diameter. They are irregularly shaped round or oval pipes, extending vertically downwards to an unknown depth, retaining about the same diameter throughout. They are said to be volcanic necks, filled from below with a heterogeneous mixture of fragments of the surrounding rocks, and of older rocks such as granite, mingled and cemented with a bluish-colored, hard, clayey mass, in which famous blue clay the imbedded diamonds are hidden.

Besides diamonds, there have been detected more than eighty species of minerals in the blue ground. The blue ground does not show any signs of passing through great heat, as the fragments in the breccia are not fused at the edges. The eruptive force was probably steam or water-gas, acting under great pressure, but at no high temperature.

Before the discovery of the mines there was nothing in the superficial appearance of the ground to indicate the treasures below. Since the volcanic ducts were filled with the diamantiferous ground, denudation has planed the surface and the upper parts of the craters, and other ordinary signs of volcanic activity have been smoothed away. Other hoards of diamonds may also be near. Where there are no surface signs, and the pipe itself is hidden under 10 or 20 feet of recent deposits, it is impossible to prospect the entire country. Accident has hitherto been the chief factor in the discovery of diamond mines.

*Abstracted from Sir William Crookes' little book on "Diamonds" (1909). Harper and Brothers, New York. The book is one of "Harper's Library of Living Thought."

How the great pipes were originally formed is hard to say. They were certainly not burst through in the ordinary manner of volcanic eruption, since the surrounding and enclosing walls show no signs of igneous action, and are not shattered or broken up even when touching the "blue ground." It is pretty certain these pipes were filled from below after they were pierced and the diamonds were formed at some previous time and mixed with a mud volcano together with all kinds of debris eroded from the rocks through which it erupted. *

Kimberley Mines at the Present Day

The De Beers Consolidated Mines, Limited, was founded in 1888 mainly through the genius of the late Cecil John Rhodes, for the purpose of acquiring all-important diamond-mining interests in the Kimberley area and thereby controlling the output. The two richest mines, Kimberley and De Beers, have been actively worked ever since, and have been the main contributors to an output which now realizes over thirty million dollars annually. The success of the consolidation is proved by the fact that since it was brought about, $120,000,000 have been paid in dividends to the shareholders, and it is roughly estimated that 40,000,000 carats of diamonds have been produced, of a total value of over $400,000,000. (1908).

The Compound System.—With gems like diamonds, where so large an intrinsic value is concentrated into so small a bulk, it is not surprising that robbery has to be guarded against in the most elaborate manner. The illicit diamond buying (I. D. B.) laws are very stringent, and the searching, rendered easy by the "compounding" of the natives, is of the most drastic character. It is in fact very difficult for a native employee to steal diamonds.

The Depositing Floors.—Owing to the refractory character of blue ground fresh from the mines, it has to be exposed to atmospheric influences before it will pulverize under the action of water and mechanical treatment.

The depositing floors are prepared by removing the bush and grass from a fairly level piece of ground; this ground is then rolled smooth and hard. The floors extend over many square miles of country and are surrounded by 7-foot barbed wire fences, vigilantly guarded day and night. The ground from the Kimberley Mine is the softest and only needs a few months' exposure on the floors; the ground from De Beers is much harder and requires at least six months' exposure, while some ground is so hard that it will not disintegrate by exposure to the weather under one or two years.

For a time the blue ground remains on the floors without undergoing much alteration. But soon the heat of the sun and moisture produce a wonderful effect. Large pieces, as hard as ordinary sandstone when taken from the mines, commence to crumble. At this stage the winning of the diamonds assumes more the nature of farming than mining. The ground is frequently

*This does not fully accord with the views of several geologists who consider that the diamonds are a part of the original volcanic material. *Editor.*

harrowed and occasionally watered, to assist pulverization by exposing the larger pieces to atmospheric influences. The length of time necessary for the ground to weather before it becomes sufficiently pulverized for washing depends on the season of the year and the amount of rain. The longer the ground remains exposed the better it is for washing.

Washing and Concentrating Machinery.—After the blue ground has been weathered for a sufficient time, it is again loaded into trucks and hauled to the crushing machinery. By crushing and washing most of the useless waste is taken out and the mixture of gravel and diamonds remains. From this mixture the rough diamonds must be sorted. For years this was done by hand. Later, after months of experimentation, an automatic sorting process was discovered. The remarkable discovery was made that diamonds alone of all minerals contained in the blue ground will adhere to grease, and that all others will flow away as tailings over the end of the percussion table with the water. Now all the sorting (except for the very coarse size) is done by these machines, whose power of distinction is far superior to the keenest eye of the native.

The discrimination of this sorter is truly marvelous. Native workers, although experienced in the handling of diamonds, often pick out small crystals of zircon, or Dutch boart, by mistake, but the senseless machine is practically unerring.

Varieties of Diamonds

Diamonds occur in all shades, from deep yellow to pure white and jet black, from deep brown to light cinnamon, also green, blue, pink, yellow, orange, and opaque.

The diamonds from each mine have a distinctive character, and so uniform are the characteristics that an experienced buyer can tell at once the locality of any particular parcel of stones.

Noteworthy Diamonds.—Prodigious diamonds are not so uncommon as is generally supposed. Diamonds weighing over an ounce (151.5 carats) are not infrequent at Kimberley. Some years ago, in one parcel of stones, I saw eight perfect ounce crystals, and one stone weighing 2 ounces. The largest diamond from the Kimberley mines weighed nearly 4 ounces troy. It measured one and seven-eighths inches through the longest axis and was 1½ inches square. The diamond, called "Cullinan" was presented to King Edward on his birthday by the people of the Transvaal. It weighed no less than 1.37 lb. avoirdupois. It was a fragment, probably less than half, of a distorted octahedral crystal; the other portions still await discovery by some fortunate miner.

We are requested by the North Star Woolen Mill Co., Minneapolis, to state that the educational exhibit furnished by them to schools has a nominal charge of 25 cents. They were erroneously referred to in the Sept., 1912, JOURNAL as the Lone Star Woolen Mill Co.

THE EMERALD MINES OF COLOMBIA

THE best emeralds of the world come from the Republic of Colombia, in South America. The famous emerald of the Duke of Devonshire is a Colombian, as is also the equally famous stone in the Hope collection.

This source of emeralds was known almost immediately after the discovery of America, for the native peoples had used the stone in their own way in some cases considering them as precious, with a strong religious significance.

Colombia supplies by far the larger quantities of emeralds. The Government does not, however, admit this mining as an open industry, restricting the deposits in the country to Government control and monopoly. The chief areas in which emeralds are found are near Bogota, the capital of the Republic, Coscuez, being one, and the better known Muzo, another. At present the concession is held by an English company, which can work the mines for 20 years, but may not extract more than the value of $1,250,000 a year, as it is thought that by this means a depreciation in the market may be prevented.

As a mineral the emerald is a silicate, the combination being with oxides of aluminum and glucinum. Other stones have the same chemical combination, the difference in color being produced by varying proportions of the ingredients, and the value placed upon any one of them—emeralds as well—depending upon the intensity of color. Chemically the emerald has about 68 per cent of silica, 15 to 18 per cent of alumina, say 15 per cent of glucina, and small proportions of iron, lime, and chromium oxide. Much of the green depends upon the amount of chromium. The specific gravity is from 2.577 to 2.725, and its hardness is much less than that of the topaz.

A fine stone of 5 carats will cost about $5,000, but such an emerald is rare. Others of less brilliancy and weight are of course of less worth. The emeralds from Muzo are celebrated for their color and "water," their clearness.

The deposits are found in horizontal layers embedded in fossilized bituminous substance, and when first exposed to the air are relatively soft. They harden, however, as time goes on. There are several groups of deposits, all within 100 miles of Bogota, but each group covers quite a superficial area, and no one of them lies at a lower level than 2,000 feet above the sea or at a greater than 7,000 feet. From May, 1904, to February, 1905, the production from Muzo (the only mine then worked) was 262,548 carats of first quality, 467,690 carats of second quality, 22,700 carats of third quality, and 16,000 carats of fourth quality, with a total value of $900,000.

The Muzo group is called the "Mina Real" (Royal mine), and has been worked from time immemorial, but a Spanish soldier, Juan Penazon (or Penajos) definitely located them in 1558. The first scientific examination

was made in 1704. A report from the English company states that the cost of mining is about $97,000 a year, not including the payment for the monopoly. The number of workmen has been upward of 300, varying according to the company's activity. Some stealing goes on, one estimate placing it as high as 25 per cent of the output. Although, including pre-Colombian mining and what has been extracted within the last four centuries, great quantities of emeralds have been sent all over the world, from the great extent of the areas containing deposits and the innumerable ramifications of the strata in which emeralds are found, it would seem quite within reason to hope that the supply of the beautiful precious stone will not be exhausted for many generations yet to come.—[*Bulletin Pan-American Union.*]

ABOUT SUGAR

THE average consumption of sugar per capita has nearly doubled in the United States since 1881. It is now 80 pounds a year, making a total of 8 billion pounds.

Fifty-five per cent of the sugar used in the United States comes from foreign countries, 23 per cent from domestic sources and 22 per cent from our insular possessions—Hawaii, Porto Rico, and the Philippines.

Two-thirds of the beet sugar produced in the United States comes from California, Colorado and Michigan.

Substantially all of our domestic cane sugar is produced in south-eastern Louisiana.

An acre of Louisiana cane produces 2,500 to 3,000 pounds of sugar. An acre of beets produces about the same amount; an acre of cane in Hawaii produces from 8,000 to 10,000 pounds of sugar.

We import practically no refined sugar; it is received in the raw state. The United States is the world's greatest importer of this commodity.

A little more than half of the world's output of sugar is from cane.

About 80 per cent of the sugar which we import from foreign countries comes from Cuba.

Two-thirds of the imported sugar enters the port of New York and is refined in or near New York City.

In the order of production, the leading five cane sugar producing countries are British India, Cuba, Java, Hawaii, and Porto Rico—four of them islands. The leading five beet sugar producers are Russia, Germany, Austria-Hungary, United States, and France.

While British India ranks first as a sugar producer, it ranks 22nd as an exporter, and third as an importer; in other words, in addition to its own production of 2½ million tons, India uses 600,000 tons of imported sugar. China, on the other hand, uses only about 1½ pounds per capita annually.

R. H. W.

GEOGRAPHICAL ITEMS OF INTEREST

Possible Agricultural Developments in Alaska

Alaska lies between latitude 51° 20′ and 71° 20′ N., and longitude 130° W. and 175° E.

Seattle is 400 miles nearer to Eastport, Me., the easternmost point of the United States, than to Attu, the extreme western point of Alaska. The meridian of longitude passing through Attu also passes through New Zealand.

The coast line is 26,000 miles long. On the south coast there are numerous deep, land-locked, ice-free harbors.

The total length of the navigable rivers is 6,000 miles. The length of the Yukon is 1,500 miles from the mouth to the Canadian boundary and is navigable by large steamers for 500 miles above that point. It drains an area of 200,000 square miles.

Alaska has an area of 586,400 square miles, of which 100,000 square miles are susceptible of agricultural use—tillage and grazing. Probably 30,000 square miles, or 5 per cent of the total area, can be made available for tillage.

Four-fifths of the possible tillage area is in the Central Plateau, of which the Tanana Valley offers the largest opportunities for farming. The Cook Inlet region has 3,000 square miles of tillable land, the Copper River drainage 2,000 square miles, and there are 1,000 square miles on the south coast, including the southeastern and southwestern projections.

It is not to be understood that the land in these areas is of such character that every half section is a possible farm home. Excepting in the alluvial-deposit areas bordering the larger streams, the topography of the possible tillable land is hilly, and in selecting homesteads care must be taken to secure a favorable slope, so as to get the full advantage of exposure to the sun. Apart from the bottom land there are few half sections all of which may be tilled, and homesteads will not be joined one to another, as a rule, but will be separated by land unfit for farming.

Alaskan soils have been formed largely from material produced by glacial action and from alluvial deposits. Gravel beds occur frequently, and these are often thinly covered with soil. Shallow lakes and lake beds abound and in the latter the accumulation of partially decayed vegetation has been transformed into peat. Where the vegetation has fully decayed there is a rich black loam.

Because of the protecting coat of vegetation and the short melting season, the frost line in the soil lowers only a few feet during the summer, thus preventing the escape of the excess of soil moisture and, together with the low temperature, the decay of vegetation. This results in a very wet, mucky, and sour condition of the soil. Consequently, much of the land before it can be made to produce cultivated crops must be drained and cleared of the pro-

tecting coat of moss and other vegetation, in order to permit the heat of the sun to lower the frost line. Lime is very generally needed as a corrective of the acidity of the soil.

Practically all of the tillable land in Alaska must be cleared of a growth of timber and moss at heavy cost.

The climate of Alaska varies greatly. On the south coast the summers are cool and the winters mild, the mean annual temperature at Sitka being about that of Washington, D. C. Zero temperatures are the exception. Precipitation is heavy, and there is much cloudy weather that is not favorable to tillage other than the growing of vegetables and grasses. The high mountains fronting the south coast intercept the moisture-laden clouds coming from the sea and cause the excessive precipitation at low levels and the permanent snow and ice fields at the higher levels.

The central plateau, consequently, has a much drier climate and a much greater range of temperature, with warmer summers and colder winters. The summers are short as to number of days, but, with 18 to 20 hours of sunshine in each 24 hours during the growing season, vegetation develops very rapidly. The winter temperatures are very low, but with dry, still air and clear weather much of the time, particularly in the upper portion of the Yukon drainage.

The flora is rich and varied. It includes 100 species of grasses, many of which are of large agricultural value for hay and silage and for grazing. The mosses and lichens of the tundra regions of western and northern Alaska are an important source of food supply for domesticated and native reindeer.

Among the native edible fruits that are plentiful are currants, gooseberries, strawberries, cranberries, blueberries, and raspberries.

Timber in the humid south-coast area is dense and of large economic value. In the central plateau it is sparse and small, but ample for local needs if it can be conserved. Of the Coniferae, spruce predominates. The balm of Gilead and quaking-asp poplars and white birch are the representatives of deciduous trees. Willow and alder thickets are widespread. There are 100,000 square miles that may be classed as timberland.

Among the fauna are the king of carnivorous animals, the Kodiak brown bear, and many other species of bears; the moose, the largest of his kind; the caribou or native reindeer that exist in large herds; mountain sheep and goats; deer; numerous fur-bearing land and sea animals; myriads of land and water birds, this being the nesting place of many of the latter; and fish in such variety and number as to make the fisheries of Alaska among the greatest in the world.

The mineral resources are vast, varied, and widespread. Gold, copper, and coal are of the greatest importance. Gold and coal are very widely disseminated. Rich bodies of copper ore have been located in the Prince William Sound region and in the Copper River drainage.

Alaska's agricultural possibilities have been in process of demonstration for 15 years by the Office of Experiment Stations of the United States Department of Agriculture, during which time experimental work has been carried on in Sitka (the headquarters station), Copper Center, Kenai, Kodiak, Rampart, and Fairbanks, besides the work done by individuals on homesteads, at schools, and at missions. The result of this effort has been to prove that hardy vegetables, small fruits, and forage crops can be successfully grown over a wide area and that dairying, poultry keeping, and stock raising are promising industries. There is ample pasturage in the tundra regions of western and northern Alaska for many thousands of reindeer.

Alaska's present population of 65,000, including natives, does not afford sufficient home market to warrant large agricultural development, especially in view of the great cost of clearing and preparing land for tillage.

The Federal homestead laws extend to Alaska, excepting that, instead of 160 acres, 320 may be filed upon. Very little of the available land has been surveyed, but that work is now in progress. One may locate on unsurveyed land, file a claim, and establish lines by metes and bounds, but he can not secure a title until a survey has been made by an authorized surveyor and the survey approved. If the survey is made in advance of that made by the Government, it is done at the expense of the homesteaders, and that is heavy.—[*Summary, Bull.* 50, *U. S. Dept. Agr.*]

Rainfall and Spring Wheat

A statistical study has recently been made* to determine whether or not there is a definite correlation between wheat yields and rainfall. In the wheat districts of southern Australia there is a practically constant difference of six between the rainfall in inches and the yield of wheat in bushels per acre. The relations between climate and crops are, in general, much more complicated, and no one climatic element has such a predominating influence as precipitation in the case cited above. Nevertheless the supply of moisture during the growing season is one of the largest factors in the production of the staple crops of all countries. In Minnesota and the Dakotas, the region covered by this investigation, wheat is seeded during April and harvested during the latter half of July and in August. There is always sufficient moisture in the ground in April to start the plant, and by July it has attained its height and is heading, at which time warmth and sunshine are needed and much rainfall is injurious. It is during May and June therefore when the plant is growing most rapidly, that the favorable effects of precipitation should be most noticeable.

Figures for South Dakota show a remarkably close correspondence between yield and rainfall for several of the years, but considerable divergences in other years; the same is true of North Dakota, while Minnesota shows

*Blair, T. A., "Rainfall and Spring Wheat," *Monthly Weather Review*, October, 1913, pp. 1515 to 1517.

more marked divergences and less correlation. In particular, the four wettest seasons in Minnesota, in which the rainfall exceeded ten inches for the two months under consideration, each produced a crop that was below normal, while of the six years with yields decidedly above normal five had less than the average precipitation. It appears therefore that a wet May and June are distinctly unfavorable for wheat in Minnesota and that the best crops are obtained when the precipitation is normal or slightly less. One evident reason for this is the poor drainage of much of the land in Minnesota. Many fields produce better in dry years because, even in years of ordinary rainfall, they become waterlogged through lack of natural drainage. No such result appears in the Dakotas, where the drainage is better and where also the average precipitation is less, approaching more nearly a semi-arid condition, and where for this reason a more direct response to increased rainfall might be expected.

A similar study was made in Russia ** with approximately the same results. Out of eleven years of observation the two with the yields farthest below normal had the rainfall farthest above normal, while the three years with yields farthest above normal had rainfall which was normal or slightly below. The author concludes that it is as a rule impossible to draw absolute conclusions based on the value of a single factor. He suggests that there is an item which, although registered in meteorlogical tables, is almost always neglected both as regards itself and as regards its relation to the other items. This is the evaporating power of the soil and of plants, which is often two or three times as great as the atmospheric precipitation.

V. C. FINCH.

THE SHIFTING OF CLIMATIC BELTS

Under this title, Professor Penck, of Berlin, discusses in the June *Scottish Geographical Magazine* the world-wide evidences of climatic changes during the glacial period. From this article, in reality an address delivered before the society, the following interesting excerpts are taken:

"We cannot regard glaciation during the Ice Age as due to local conditions, but must consider it in relation to a universal alteration in climate."

"All this leads us to assume that the area of extreme aridity in Africa once lay much nearer the equator than it does today, exactly as was the case in both Americas, and, guided again by the phenomena of the Great Basin, we may fix this period in the Ice Age. The Great Ice Age presents itself then neither as a period of extreme cold—as was originally held—nor as a period of excessive humidity over the whole earth, but as a period during which the climate belts were shifted into lower latitudes. During this period

**Nerucev, M., "On the Estimation of Humidity in Agricultural Meteorology," abstracted in the *Monthly Bulletin of the Bureau of Agricultural Intelligence and Plant Diseases*, April, 1912, p. 862.

the great arid regions of the world lay some 4 or 5 degrees nearer the equator, while the snow-line was found more than 3300 feet lower."

"The 4000-foot snow line which today runs along the west coast of Norway . . . extended 17° farther south than now—roughly some 1200 miles. Eastward the shifting is still more remarkable, for the line traversed the Urals during the Ice Age in 62° N. lat.—a point some 1400 miles from its present position."

"Similar has been the shifting of the 4000-foot snow-line on the west coast of South America. Today it is found in the extreme south of Patagonia. During the Ice Age it was situated about 42° S. lat., some 900 to 1000 miles nearer the equator . . . The 6000-foot snow-line which we find today in Central Europe was shifted during the Ice Age, at most some 700 miles farther south. . . ."

"The fact that the snow-line in the arid region was specially high during the Ice Age, affords a new ground upon which opposition may be offered to the theory that the Ice Age was a period of excessive humidity, for had it been so the arid areas of the earth would have shrunk, and the snow-line in these areas would have descended to a specially great extent. As this is not the case, we may conclude that the Ice Age was rather a period of low temperature, and that this low temperature was universal throughout the world. For had the lowering of the temperature occurred on only one or the other hemisphere, as is demanded by Croll's theory, then the depression of the snow-line at the equator would not correspond as it does to the depression in temperate latitudes."

"A general lowering of temperature, however, would bring about not only an advance in the snow-line, but at the same time a shifting of all climate belts equatorwards. If the heat supply of the earth decreases, the atmospheric circulation will become less intense. The great areas of high pressure will become weaker, and the horse-latitudes must move towards the equator. And it is they that determine the position of the arid areas upon the land masses. Thus, everything points to the fact that the cataclimate of the great Ice Age was a period of reduced heat supply on the whole earth."

"The shifting of the climatic belts, however, during the Ice Age, has never gone so far that one belt has entirely usurped the position of another. Rather we meet everywhere with *constant regions,* where the climate has remained unaltered, where there has always been a snow, a humid, or an arid climate, and *shifting regions,* where snow and humid, humid and arid, and arid and humid, have alternated."

"But the main fact remains unaltered that during the Ice Age the essentially tropic zone was smaller than at present. The arid areas of the northern and southern hemispheres approached one another, and in this shrinkage of the tropical humid zone the influence of an Ice Age in lower latitudes would be most clearly reflected. . . ."

Physiographically Unfinished Entrances to San Francisco Bay

Under the title "Physiographically unfinished entrances to San Francisco Bay, R. S. Holway of the University of California has discussed (*Uni. of Calif. Publications in Geog.*, Vol. 1, pp 81-126) the origin of seven low passes through the Coast Range of California which a comparatively slight subsidence of 350 feet, would convert into entrances of San Francisco Bay. Evidence is presented to show that the Bay occupies a part of a longitudinal valley formed by the folding of the Coast Range. This valley does not all drain into the bay. Both ends have outlets to the sea through narrow gorges. Only one, however, of the low passes to the ocean, termed "unfinished entrances," is of structural origin. This is the Merced valley, just south of San Francisco.

Of the other valleys, Liberty Gap is classed as an area not much uplifted at the time of the formation of the Coast Range and subsequently trenched by streams, reaching to the ocean. The origin of Lagoon Pass and Elk valley, the two depressions between Liberty Gap and Golden Gate is less clear. Holway classes them as remnants of the valleys of streams which once flowed directly to the ocean but were diverted by the formation of the San Francisco Bay valley. An alternative is to suppose them to be due to the meeting of the headwaters of streams developed under present conditions. This hypothesis is not in accord either with the low grade of the passes or the directions from which tributaries enter the main valleys, both of which indicate a reversal in stream direction in the eastern portion of these depressions.

Russian River, which drains the north portion of San Francisco Bay, Golden Gate, and Pajaron Canon are held by Holway to be the valleys of rivers which maintained their courses during the uplift of the range. Both these streams are separated by very low divides from the bay drainage but turn abruptly into the mountains and reach the sea through canons. To check the idea of persistence rather than diversion through capture by streams working back from the ocean, the fish of the different drainage basins were compared. It is stated that no evidence was found to show the recent passage from one basin to another of any species except some small ones which inhabit the headwaters. These might pass the divides through the shifting of tributaries on their alluvial cones so that they have changed from one drainage system to another. Another line of evidence showing that the breaks in the range are due to persistence and not capture or overflow of the range, is that they do not occur at the lowest points or in the structural depressions like Merced valley. The great depth of Golden Gate is explained by the large size of the Sacramento River by which it is believed to have been eroded. Carquinez Strait which joins San Francisco Bay with the great interior valley of California is believed to have also had the same origin.

F. T. Thwaites.

Central Arabia

Captain Leachman in a description of a camel trip through Central Arabia, published in the *Geographical Journal* for May, gives some interesting bits of information in reference to that little known country. As to the climate he says, "Bitter cold was experienced in the plains in the winter and the water skins were frequently frozen hard in the morning—so much so that we had to thaw them by the fire before loading, or otherwise they would rub sores on the camel's hide."

As to the ways and endurance of camels in desert work the following extracts are interesting: "Here—at the desert wells—the camel drinks, in itself a somewhat remarkable sight, as however thirsty he may be, it is done in the most leisurely fashion, and he appears to taste the full joy of a long drink in the manner of a gourmet born. He first wets his lips and again raising his head proceeds to shake it and look about him. After a pause he drinks a little more, and the same process is repeated, and thus each drop of the precious liquid is absorbed with appropriate relish. In the winter a camel will last seven days without water and without great discomfort, while in the spring when the green grass appears, he will drink but rarely, and remains often a couple of months waterless."

The Bedouin is extraordinarily kind to his camel and in return the Arabian camel is a very different animal from the ill mannered and treacherous variety encountered in India. His powers of endurance are extraordinary and some of the stories of great journeys done by camels are almost beyond belief. The camel rider, whose duty it was to carry the post from Damascus to Baghdad, generally covered an average of sixty miles a day for nine days. Burkhardt has a story of a camel who covered 115 miles in eleven hours.

R. E. Dodge.

Movement of Water in the Japan Sea

A recent number of the Tokio geographical magazine contains something that may be of interest and I am going to send you its review.

A hydrographer carried on his experiment in Japan Sea after the war with Russia, floating 750 bottles in all and obtained the following results. He recovered 16 per cent of the total number of bottles he floated. During Japanese Russian war Japanese set 840 mines at the mouth of Vladivostok under the cover of the night, and it is possible that Russians placed three times as many as we did. 306 submarine mines after having gotten loose in some way were washed ashore or were picked up along the provinces on Japan Sea. An interesting thing is that where a great number of mines were washed ashore there were recovered the greater number of bottles. One exceptional case is that one of the bottles reached Tokio Bay after 204 days. It is therefore evident from his experiment that there is a regular circulatory current being set up in Japan Sea which goes round counter clockwise.

George Nishihara.

Trade on the Yenesei River

The Yenesei is the fifth longest river in the world with a length of about 2900 miles. It is very rarely narrower than half a mile and for a distance of three hundred miles from its mouth it varies in width from ten to thirty miles. On the lower reaches the goods are transported in barges towed by tugs. From the upper parts of the river rafts are sent down simply drifting with the current. There is a kind of barge which is used for drifting purposes and these are usually sent from the more cultivated districts on the upper part of the river loaded with various necessaries of life and broken up at their destination which is north of the tree boundary. The material thus obtained is used for the erection of houses.—[*Geog. Journal, May,* '14.]

R. E. Dodge.

Variations in Temperature of Hot Springs in Japan

Arima Hot Spring near Osaka shows from its historical records of more than 300 years that the temperature of the spring has not been constant. A recent investigation has revealed that at the time of earthquake the temperature rises suddenly and the water becomes too hot to be bathed in. At present it is 49-54 degrees C. I think this has some important bearing upon the question of the subcrustal portion of the earth. The earthquake must be therefore due to some movement of molten rocks underlying there and not to adjustment of sliding blocks. It shows that the molten rock is not very far below the zone of the ground water. It also shows that the rock may remain in molten condition at comparatively shallow depth. There are no active volcanoes near there, and it is strange to see how long this thin crust over nature's crucible can stand without being broken.

George Nishihara.

The Use and the Waste of Wood

Sawdust is now becoming of sufficient value to ship it to points where it can be used for ice packing, stable bedding, stuffing for upholstery, packing glassware, for shipment of metals, crockery, etc. Sawdust is even used for the manufacture of gunpowder and in Europe it is compressed into briquettes and sold for fuel. A few plants have already been organized in this country for utilizing sawdust for briquettes. Slabs, edgings and tops are now being profitably converted into cooperage stock, broom and other handles, wood turnery, wooden dishes and novelties, dowels, furniture rounds, etc.

Lumbermen and others have shown recently that only 40 per cent of the trees cut in the forests of this country are used for lumber. The remaining 60 per cent represents pure waste as high stumps and tops either left to rot in the woods or as slabs consumed in the burner or slash piles at the mill. In Germany about 95 per cent of every tree grown in the forests is used. Practically nothing from the forest is allowed to go to waste, even the stumps are grubbed out and the twigs and branches tied up into faggots for fuel.—[*American Forestry.*]

THE BALKANS AND TURKEY

(Excerpts from article by C. H. Bellamy, *Jour. Manchester Geog. Soc.*)

The Balkan Peninsula has been in modern times what the Low Countries were in the Middle Ages—the cockpit of Europe. It is there that the eternal Eastern question had its origin; it is there, too, that the West and the East, the Cross and the Crescent, meet. But to understand the great problems which still await solution in South-eastern Europe, and are once more pressing themselves upon the attention of all thoughtful men, it is important to have some knowledge of Balkan history. The mutual jealousies of Bulgaria and Servia, the struggle of various races for supremacy in Macedonia, the alternate friendship and enmity of the Russian and the Turk, are all facts which have their root deep down in the past annals of the Balkan States. Few persons in Western Europe seem to remember what has never been forgotten in the Peninsula,—and this is forced upon you over and over again as you visit their towns—that there was a time when the Servian and Bulgarian Empires were great Powers, and their respective rulers governed with the proud title of Czar a vast realm, which is still the dream of patriots.

The Bulgarian Empire of nine hundred and a thousand years ago, under the Czars Simeon and Samuel, ran from Mesembric, on the shore of the Black Sea, to Mount Rhodope, and then right across the Peninsula from Mount Olympus to the Albanian coast opposite Corfu. With the exception of a few ports, all Albania was Bulgarian, as was also nearly the whole of the present kingdom of Servia. Before the Magyar invasion Czar Simeon seemed to have included part of Roumania in his dominions, and it is possible that portions of Hungary and Transylvania owned his sway. Bulgaria under his auspices, was—what she has never been again, but what she still aspires to be—the dominant state of the Balkan Peninsula.

Then, like a page of romance, we learn how this mighty empire crumbled away before the assaults of its enemies, and came under the power of the Greek Emperors; and how, one hundred and sixty-eight years later Bulgaria was delivered by John Asen, who founded and consolidated the second Bulgarian Empire, of almost equal territorial importance to the first.

After the lapse of two centuries this empire fell, and the nation came under the domination of the Turks for nearly five hundred years. In the early part of the nineteenth century the revival of the spirit of independence began. One result of the Turco-Russian War was the constitution of the principality of Bulgaria, and the autonomous province of Eastern Roumelia, and the election by the National Assembly at Tirnova in 1879 of Prince Alexander of Battenberg as their first Prince.

The Bulgars are a fine race of men, especially the hearty young countrymen in homespun garments and hide sandals, all well clad, clean-limbed, upstanding young fellows of eleven or twelve stone, with healthy, smiling faces. The peasant people own the land which they till so carefully. Even

amongst the poorest in the villages it is the exception to find a man who is not a landowner.

Bulgaria is one of the greatest rose gardens of the world. Few parts of Europe have been so often laid waste; in few has the ground been so plentifully drenched with blood, century after century. In none, perhaps, have so many different races fought for the mastery. But when the warlike storm has spent its force fresh roses spring up, filling the land with fragrance and bringing a rich material reward to its children. Some of these rose gardens are sixty miles long, and from them the world gets its principal supply of attar of roses.

Sofia, the capital of Bulgaria, is one of the cleanest cities in Europe. All the principal streets are paved with tiles, the shape and size of a brick, and they appear to stand the traffic admirably, and all of these streets have electrical trains running through them. Sofia is the only town in the country of over 50,000 inhabitants. In 1887 it was estimated to have a population of about 20,000, whilst to-day (that is, before the war) its inhabitants number about 100,000; and in these twenty-five years it has been completely metamorphosed, the same quarter of a century having entirely changed the country. Then, there were no railways in Bulgaria proper—only some two hundred miles of line, constructed under the auspices of the Turkish Government, were open to traffic in Eastern Roumelia—now Bulgaria possesses some twelve hundred miles of railways, besides nearly two hundred under construction.

Nor does the history of Servia lack its romance. Out of a loose federation of chiefs the Servian monarchy was gradually developed, its golden age beginning with the accession of Stephen Dusan in 1336. Never has the power of Servia been so great or the Servian dominions so vast as under the sway of this mighty ruler, who raised his country to the rank of an empire, equipped it with a complete code of laws, and made it respected all over Eastern Europe. Under the weak rule of his son his empire slowly melted away, and in the struggle with the Turks the Servians were vanquished at the famous battle of Kossovo, on June 15, 1389, a battle which for five centuries decided the fate of the Balkan Peninsula.

In the first quarter of the last century Servia began to feel after her lost independence, and in 1817 Milosh Obrenovic was elected Prince of Servia, which dignity lasted in his family until it was exchanged in 1882 for the title of King.

Nor are the histories of the other Balkan States wanting in romance and interest. Roumania, the name adopted at the union of the two principalities of Wallachia and Moldavia, has been subject to Hungary and Poland, to Austria and Russia, as well as Turkey; and only emerged from the supremacy of this latter Power in 1859, the caping-stone of Roumanian independence being set by the proclamation, on March 26, 1881, of Prince Charles as King of Roumania.

Bucharest has over 300,000 inhabitants, with many fine public buildings. It is one of the gayest capitals that I know, and in proportion to its size rivals Vienna and Paris in animation, for at midnight it is as lively and gay in the centre of the city as at midday, and some of the cafes never close, day or night.

Bucharest claims that she has got the finest post office in the world, and there is some foundation for her claim. Her streets are being widened and embellished on every hand. The railway system of the country is being reorganized, no expense is being spared, the immense bridge over the Danube being a remarkable engineering achievement. She is exploiting her vast stores of natural oil, and if she has given concessions to foreign companies, they are hedged round with restrictions for the benefit of the country. But, as in many another new country, corruption and bribery are rampant in official circles; the taxes are very onerous, and press heavily upon all classes. However, under the enlightened sway of King Carol, Roumania is working out her own redemption, and with her immense natural resources of oil and magnificent steppes for the cultivation of corn, maize, etc., will undoubtedly occupy a leading place in the Balkan States.

Montenegro was an independent State in the fourteenth century, from which time to the nineteenth, its history has been a record of battles and raids against its neighbours, and at a time when the whole of south-eastern Europe, to the very gates of Vienna was trembling before the Turks, the Montenegrins managed to vindicate and maintain their independence. A new era began with the reign of Peter II., from 1830-51, and the present ruler, now a King, waged successful wars against the Turks, and by the Treaty of Berlin in 1878, obtained full recognition of his sovereignty.

Mediaeval and modern Greece affords the student of history one of the most remarkable romances he can desire. The great Byzantine Empire dwindled away, especially under the inrush of the Ottomans, and in the later middle ages she became subject to the Venetians and other foreign rulers, eventually seeming to lose all national character and spirit under the Turkish subjection.

But her national soul woke in the War of Independence in 1821, and success followed the uprising. King Otho was elected in 1832, and henceforth Greece has existed as a recognized independent kingdom.

About the Turks I need not say much. When they came to Europe they were a great people—a great military people. In manners and customs they were probably not more cruel or barbarous than the peoples they conquered; in the middle ages everywhere folk were cruel beyond belief. In point of power and organization and military skill, however, they were greatly superior, and they were led by Sultans who, in many cases, had a genius for generalship. But beyond conquest they had no ideas. They camped on vanquished territory, and forced the people to feed them, and this policy they have pursued right to our time.

RECENT PUBLICATIONS

RUSSIA OF THE RUSSIANS. By Harold Whitmore Williams. 430 pages: 32 plates and a map in colors. Charles Scribners Sons, N. Y., 1914.

This is the latest or 13th volume in the "Countries and Peoples Series." It is an excellent book, written with full knowledge of the things with which it deals, and is notably free from bias. In chapter I, "The Growth of Russia," the author lays strong emphasis upon the geographical factors. He says, "The fundamental difference between Russian and English History is the difference between the great plain and the island." The bureaucracy, the constitution and the position of the press are treated in a way which enables the American to understand some of the most fundamental differences between the Russian government and the liberal western governments. Of the press, he says, "It is still subjected to a variety of harrassing restrictions, but is freer than it was eight or nine years ago. * * * Public opinion does not find expression to any considerable degree in the Press."

The intimate interaction of church and state are treated. "The Russian heads his letters with a date 13 days later than that recognized by the rest of the civilized world simply because the church insists on the maintenance of the Old Style." The church is a bureaucratic institution and the village priest is made to feel that he is a part of the bureaucracy, a government official.

The chapter on Peasants and Proprietors contains much geographical material: it opens with,—"Russia is an agricultural country *par excellence*. Of its 164 millions of inhabitants three-fourths, or over 120 millions, are engaged in agriculture. It is a country of peasants. The prosperity of the Empire, the state of the budget are dependent principally on the state of the crops. Even the political situation is largely dependent on the harvest." The cities are said to be with difficulty emerging from the market-town stage. The peasants are of infinite variety and of every degree of poverty and prosperity, ignorance and intelligence. Drunkenness is prevalent. The state monopoly of alcoholic liquors yields $400,000,000 in taxes and an abundant harvest of state-made drunkards. There are German and Lettish peasants who prosper greatly on land of the same quality as that on which the Russian peasants merely eke out an existence. The communal system of land tenure is breaking down. Thousands of peasants are emigrating to Siberia and certain Siberian towns are growing rapidly; one town in the Altai region having grown to 80,000 in seven years.

The large estates of the landed gentry are breaking up. "Russian culture was in the first instance and still largely is, a culture of the landed gentry."

The chapter on Trade and Industry is also geographical. Transportation conditions are discussed. "The primary consideration in the construction of many of the chief Russian railways has been strategic, and strategic and economic interests by no means coincide." Of manufacturing, the author

says it is a small thing in comparison with Western Europe. "It lags behind in the application of mechanical power." The final chapter is an excellent description and analysis of St. Petersburg. The book is entitled to recognition as one of the very best on the subject with which it deals.

Iceland, Horseback Tours in Saga Land, by W. S. C. Russell, a science teacher in Springfield, Mass., has recently been published by Richard Badger, Boston, and by The Copp Clark Co., Toronto ($2.00). It is a well organized and well written account of four summers of travel in Iceland. The book is popular rather than strictly geographical, but the author, having considerable knowledge of geography and physiography, has made a book which is much more than a mere traveler's random observations. It is one of those books which both the scientist and the general reader finds satisfying. The book is distributed also by the Cambridge Botanical Supply Co., Boston.

A Book of Discovery by M. B. Synge is among the recent geographical offerings of G. P. Putnam's Sons. It is a 500 page volume giving a history of the world's exploration from the earliest times to the discovery of the South Pole. Each of the 73 chapters deals with a different event or group of events or with the work of a successful explorer. Illustrations are profuse, including half-tones, nine colored plates and reproductions of ancient and mediaeval maps. The book is not a reference work for scholars but is rather, an account of inherently interesting events, written in a simple, easy style well suited to young people. Boys in their teens will read it with eagerness. It is a good book for school libraries and pupils who read it will find geography a more interesting study thereafter.

The Beginner's Garden Book is the title of a 400-page text-book just issued by the Macmillan Company ($1.00). It is written by Allen French and is designed for use in the upper grammar grades. As its title indicates, the book is a hand book in gardening. It divides the work into "Autumn Work," "Winter Work," "Gardening under Glass," and "The Real Garden." Excellent illustrations, review questions, and an interesting manner of presentation are qualities of the book.

Germany of Today is volume 72 in the Home University Library (Holt, 50 cents). It is written by Charles Tower, and is up to the high standard which the series is so admirably maintaining. Its 250 pages can be read at a sitting and when the reader finishes he feels that he has seen Modern Germany through the discerning mind of an author who understands the German people and the German nation. He sees both the weakness and the strength of Germany.

Latin America is volume 78 in the same series. It is written by Professor William R. Shepherd of Columbia. He places the emphasis upon "in-

stitutions and culture," and upon "phases of civilization" in the Latin American Republics. Several of the chapters are geographical; for example, the ones on Geography and Resources, on Industry, on Commerce and on Transportation. The individual republics are not treated separately but their resemblances and differences are brought out by comparison. The terse, crisp style made necessary by the space limitations placed upon the author give the book added value to the busy man who desires to get an authoritative account of Latin America in brief space.

Hardwood Forests of Southern South America

Owing to the fact that leather tanning extracts which formerly came almost entirely from hemlock and oak bark have been largely replaced by quebracho tanning extracts from the forests of South America, the following note will be of timely interest:

The manufacture of the quebracho tannin is conducted in numerous little factories in the forests of the Chaco region, mostly located in the province of Santa Fe, Argentina. The quebracho forests of the north and northeast remain by far the country's most valued supply of hardwoods. Within the past decade the amount of logs exported has increased from 245,000 tons to 445,000, and of extracts, from 9,000 to 84,000 tons. In this great land of forests and glades, rising from the Parana river toward the northwest, some 300 saw mills and extract factories are eating out its vitals, backed by 25,000,000 dollars of capital and $45,000,000 of sales. The largest company employs 4,000 or 5,000 workmen in getting out the timber and transporting it to the saw mills and extract factories.

The greater proportion of the population of the quebracho country are a mixed race of Indians and the whites of all nations. The cultivation of cane and the manufacture of sugar are prosecuted over a large extent of northern and northwestern Argentina, and in these industries several thousand Indians and mixed Correntinos are employed every year as unskilled laborers. Many more work in the quebracho forests. At the end of the sugar season these savage workmen will return to their homes in the Chaco country, traveling sometimes four or five hundred miles over mountains and through swamps and forests. They will then fell the quebracho trees on the banks of the rivers and streams, bind them into rafts with lighter woods beneath as floating buoys, get out fence posts and sleepers and assist in preparing the red quebracho for the manufacture of the tannin extract.

The management of these hardwood industries is chiefly in the hands of Europeans of Latin and German stock, with a threatened incursion by capitalists of the United States. The Farquhar syndicate, a powerful combination of New York moneyed men, is solidly intrenched in Paraguay and southwestern Brazil and is making ceaseless attempts to penetrate the quebracho region of Argentina.—[*American Forestry.*]

A GEOGRAPHY QUIZ ON THE CONTINENTS

1. What land was "The Dark Continent" until a few years ago?
2. What continent is the homeland of Western Civilization?
3. What continent was the last to be discovered by civilized peoples?
4. What continent is inhabited mainly by Spanish-speaking peoples?
5. What continent contains the countries of the Far East?
6. What continent was inhabited only by a black race when discovered?
7. In what continent did the great religions of the world originate?
8. What continent is the home of most people?
9. What continent is governed by rulers or colonists from another?
10. What continent contains the least waste and uninhabited land?
11. What continent has a great desert merging southward through grasslands into dense forests?
12. What continent is a peninsular portion of a larger continent?
13. What continent lies south of the equator?
14. What continent has its larger part north of the equator?
15. What continent extends nearest to the south pole?
16. Which continent of the Western Hemisphere extends farther to the east?
17. Which continent of the Northern Hemisphere extends nearest to the equator?
18. What continent lies north of the tropic of cancer?
19. What continent is east from Central America?
20. What continent extends into both temperate zones?
21. What continent in west longitude is crossed by the tropic of cancer?
22. What continent has the most irregular coastline?
23. What continent has the loftiest, largest highland?
24. What continent has a highland extending from end to end, without any low pass?
25. What continent has no lofty mountains, always snowcapped?
26. What continents have their main highlands in their western part?
27. What continent has lofty mountains but no long continuous highland?
28. Which continent is heavily forested on the western slope of its southern portion?
29. Which on the eastern?
30. Which continent is reached by the equatorial rain belt only in our winter season?
31. Which continent has the greatest extremes in tmperature and moisture between its different parts?
32. Which continent has the longest river system?
33. What continent has the river basin with the greatest total rainfall and outflow?
34. What continent has the most populous flood plains?
35. What continent has the largest freshwater lakes?
36. What continent has the largest salt lakes?
37. What continent produces most corn?
38. Most coffee?
39. Most sugar?
40. Most wheat?
41. Most tea?
42. Most silk?
43. Most of the finest wool?
44. Most flax?
45. Most cotton?
46. Most rice?
47. What continent owns most large ocean steamers?
48. What continent owns most large lake steamers?
49. Which continent has most cities of the first rank in population,—a million or more?
50. Which continent has the greatest railway mileage?

PHILIP EMERSON.

The JOURNAL of GEOGRAPHY

VOLUME XIII OCTOBER, 1914. NUMBER 2

IN THE DOMAIN OF THE HUDSON'S BAY COMPANY*

By Charles K. Leith
University of Wisconsin, Madison

AFTER sixteen consecutive days of canoeing, we came suddenly in view of the French post near Moose Factory, located on an island in Moose river 12 miles from its mouth. We landed there, thinking it to be the post of the Hudson's Bay Company. A mile away on Moose Island is the administrative headquarters of the Hudson's Bay Company for the bay, which we reached an hour later. It was established in 1675, and is operated today in much the same fashion as for the past 240 years. Some of the present buildings and parts of buildings run back to the period of our American revolution. We here first experienced the charming and unique atmosphere of the Hudson's Bay posts; a charm which we also felt at each of the succeeding posts, although perhaps in a less degree. The small cultivated fields, substantial houses, with high hewn picket fences, church, rectory, school house, stores, warehouses, carpenter shop, saw mill, the great flagstaff guarded by cannon, the general air of permanence and respectability, all contrast vividly with the conditions in the wilds about. On landing, we were greeted by Mr. McAlpine, the manager of the post, and the foreman, Mr. McLeod, who, as is the custom with whites at all posts, appeared neatly dressed even to spotless collars and straw hats.

MOOSE FACTORY

Space forbids any detailed description of Moose. At every turn one sees features of interest. The place includes some 30 or 40 buildings, laid out in irregular streets, with a fringe of Indian tepees in the adjacent fields, with a permanent population of about 100 and a floating or hunting population of several hundred. It is a fully organized community with a post manager at the head of its temporal affairs, and a bishop, when in residence, at other times his assistant, in charge of its spiritual affairs. Two services are held Sundays which are well attended, and during the summer, when many Indians are at the post, there are daily services. Sunday services are conducted in English, and repeated in Indian. The first sermon we heard contained many references to the dangers to the young to be met with on the "streets of Moose," bringing us to a realization of the fact that we were in an organized community which regarded itself as a village or town. We subsequently found that at other points on the Bay the "streets of Moose" were regarded as a combination of Broadway and the Bowery.

*From "A Summer and a Winter on Hudson Bay" by C. K. and A. E. Leith. Privately published.

Ruperts House

Ruperts House, the next post visited, on the southeast corner of the bay, is of special interest. This is nearly on the site of old Fort Charles, the first of the Hudson's Bay Company posts established in 1670. It was here also that Henrik Hudson was supposed to have wintered when he first reached the bay in 1610. It is one of the most important posts on the bay, being the distributing point for a chain of five posts, in the interior. We were the second party of visitors in several years at Ruperts, while Nitchicun, 500 miles distant in the interior, has not seen a white man since 1870.

The Hudson's Bay Company

The Hudson's Bay posts visited were strikingly similar in architecture and atmosphere to Moose Factory. Indeed, this similarity extends throughout fourteen posts which it has been my privilege to visit this and other summers. The comfortable house of the manager, with its well-kept yard, hewn picket fence, huge gate, usually a garden plot for potatoes and other hardy vegetables, and buildings and pens for cows and chickens, form the central feature of most of the posts. Near it is the store, containing everything necessary for the needs of the country, from pork and flour to sewing machines and phonographs. The large warehouses are conspicuous features. At a central point, a high flagstaff is to be seen on which the Hudson's Bay flag is displayed on approach or departure of visitors. The complete control of the post manager over the affairs of his subordinates and dependent Indians, together with the regularity of the day's proceedings, marked by the bell, give an air of a certain military precision to the place quite at variance with the straggling architecture and the appearance of some of the inhabitants.

The Hudson's Bay region has been under the almost exclusive control of the Hudson's Bay Company for two hundred and forty years. A few brief attempts at competition have hitherto met with failure, but for the past few years Revillon Freres, of Paris, have been making a strong attempt to gain a foothold and have accomplished more than any of their predecessors. The Hudson's Bay Company has from the first devoted its attention exclusively to the fur trade, and has discouraged all efforts on the part of its own employes or others to develop other resources. So far have they gone in this direction as to discourage even minor changes in the manner of conducting their business, such as introducing more satisfactory means of travel and communication, which in their judgment would tend to take attention away from their principal business of securing fur. The large blank areas on existing maps of the region about Hudson's Bay are eloquent testimony of the attitude of the Company in this regard. There is today, outside of the Hudson's Bay posts and the posts of their competitors, Revillon Freres, so far as the writer knows, not one habitation of wood or stone. Probably nowhere else in the world could there be cited a similar case of arrested development of a great region under control of white people. The Company was organized to trade

in fur, and the characteristic British conservatism has kept it strictly to its text. The stock is in strong financial hands in England, largely in the nobility, whence a conservative attitude would be expected. The Company doubtless foresees that as soon as the region opens up for anything else which will bring in a population not giving its attention to trapping, its primary business of buying furs will rapidly disappear.

Perusal of the daily journals kept at each of the Hudson's Bay Company's posts brings vividly to mind the permanence of the institution. Wishing to know the probable condition of the weather for some of our trips, we were able to ascertain exactly what had happened in the way of weather, hunting, and other incidents the same date the year before, two years before, fifty years or even one hundred years before, and so far as the nature of the record is concerned and the character of the events noted there is little evidence of change in conditions.

The Hudson's Bay Company controls fifteen posts on Hudson Bay, located usually near the mouth of some river. Each post has its post manager, foreman, servants (natives and mixed breeds) from one or two to twenty, depending on the importance of the post and its quota of natives dependent upon the post. It is only during the summer, when furs are not in prime, that most of the people are to be seen about a post. Then the Indians and their families come in with their furs of the preceding winter, trade for their supplies, and have a period of social relaxation before returning to their camp grounds in the wilderness. Then the neighborhood presents lively scenes, the buildings and yards being surrounded by a fringe of tents of the visiting Indians. During the winter the Indians are scattered about the country in small groups within a radius of 150 miles or more from the post, and at the post there are only the people immediately concerned in its operation, together usually with a considerable number of natives incapacitated for trapping by age or infirmity. The total population dependent upon each of the posts ranges from fifty to eight hundred or nine hundred people.

Relations of Hudson's Bay Company to Natives

The unit of trade is the "beaver," an arbitrary value represented by a brass token issued by the Hudson's Bay Company, nominally worth a dollar, that is, a dollar in trade. In cash a beaver is worth fifty cents. When, therefore, a native is paid a beaver, and takes it out in trade, as he must, he really gets something in the neighborhood of forty cents in value.

Each Indian has a debt to the Company. When he buys his supplies for the year's hunting he is said to "get his debt." The size of the debt the Company will allow him depends somewhat upon his ability as a hunter. At the end of the year he turns in his furs in liquidation of his debt. Often he does not succeed in getting a surplus. The result is that the Company has a debt on the books for most of the Indians over whom it has control. On death or prolonged sickness the debt is wiped off.

None of the natives are independent. Attached to each of the posts are natives said to be well-to-do. These possess few evidences of worldly wealth beyond suitable clothes, substantial food, and good rifles and guns, but they have such credit with the Hudson's Bay Company as will enable them to buy certain articles they may need to help them live comfortably. This simply means that they have been sufficiently successful as hunters and have turned in enough furs to establish a certain prestige with the Company, and the Company treats them well as a reward for faithful services and as an incentive to others.

To the stranger on the Bay, at first thought, the native's lot does not seem an enviable one. The Indian is in a condition not far removed from slavery. With his best efforts he can secure for himself only food and clothes. He cannot secure independence. On the other hand, he is certain of a living if he is reasonably diligent in trapping; he will be taken care of in case of incapacitation; his family will not be allowed to starve, and above all, he is in a reasonably contented and happy frame of mind over the situation. He is better off than in the days of uncertain supplies, before the Hudson's Bay Company came, and he seemed to us better off and happier than most of our laboring people. While he undergoes hardships, he seldom endures the extremes of poverty and never feels that he is suffering injustice greater than that of his fellows; he is on a substantial social equality with the rest of the population, and altogether is a decent, self-respecting, efficient, and contented being.

The attitude of the Company toward the Indian is a curious combination of stern, relentless control with a sort of furtive kindliness. When an Indian is asked to do certain arduous work or make a dangerous trip, he has been taught to obey unquestioningly and to accomplish his mission at any cost of life or limb. He carries his message to Garcia without the prospect of being greeted as a hero on his return. If he fails to carry out his orders absolutely he will get no sympathy from either the Company or his friends. While traveling from post to post we had occasion to use a number of Indians who were picked out by the post manager to accompany us, sometimes on a trip which meant exposure and hardship for weeks; and while these Indians often disliked leaving a comfortable post and families to go off with strangers in whom they had no interest, there was never a murmur when once they had been selected to go.

About the posts the Indians are, for the most part, treated rather gruffly. Some post managers spend their time mostly at the house rather than at the store. The Indian wishing to trade, hangs around the kitchen door until he learns through the servants that the manager may be seen, then timidly knocks and comes in, hat in hand. The manager, after a time, looks up from his business or paper, or interrupts any conversation he may be carrying on and asks what is wanted, and if the Indian's credit is good, gives him an order

on the store for such things as he needs. The length of time the Indian is kept waiting and the graciousness of the post manager's behavior toward him are an excellent barometer of the Indian's standing with the Company and in the community.

By a combination of sternness and kindliness the Company has been able to foster a loyalty among its servants and natives which is very unusual in a commercial concern. This same loyalty is true of the post managers.

The Indians and the Huskies

The natives, both Indians and Huskies (Eskimos), show many shades of color, which fact may be correlated with the prevalence of Scotch and English names and characteristics. There is a strong family pride, much observance of form, and the language even shows Scotch modification, especially in inflection.

A universal habit on the Bay is to shake hands in meeting and parting. Wherever we stopped we found it necessary to shake hands with all members of the party, men, women, and children. Neglect of this duty was likely to be resented. In some cases, where fifty or more people were met simultaneously, the ceremony became a formidable one.

The natives work hard and lack what most of us would call the comforts and conveniences of life, but they and their ancestors have known no other way of living, and therefore do not miss the things we regard as desirable, if not essential. There is little social competition, for all are substantially on the same level. Their lives are not complicated by a multiplicity of interests and distractions, but are concentrated on the hunt which furnishes the wherewithal to live, and incidentally affords most of their pleasure. Their family life seems to the outsider remarkably happy, notwithstanding a common method of choosing mates which is often intensely practical and lacking in sentimental consideration. Mr. Nicolson, post manager for Ruperts House, told of an Indian from one of the interior posts coming to him just before our arrival, and after buying his supplies over the counter, added that he would like a wife. The post manager did not have one in stock, but not to be stumped, had a canvass made of the post, found a suitable woman, and before night had the pair wedded and started for their camp five hundred miles inland. That marriages so made could result satisfactorily is astonishing at first thought. I suspect the explanation lies largely in the unity of material interests in the family and the lack of outside distractions. From the start the entire energies of the family are devoted to making a living under strenuous conditions. The man kills the game and the woman skins it and prepares the fur and food from it. There is scarcely a day in which close cooperation is not necessary. In times of stress and adversity they must look only to themselves for help. The result is a close welding of interests and development of team work which enable them to cope with their many difficulties and which seem to make a contented, if not ideal family.

The Post Managers

The post managers warrant a bookful of character sketches. Usually of English or Scotch descent, they are selected when young men, and sent out to the Bay by the annual boat. For the first eight years they are not entitled to a furlough, and should they leave, forfeit some portion of their pay. After eight years service they are in a position to ask for a furlough, but as the rules of the Bay Company permit only one man in a district to be absent on furlough in any one year, the difficulty of getting away is so great that furloughs are few and short. It is not unusual to meet men who have not been out of the Bay in twenty-five years. One man, Mr. Jobson, the present manager of the East Main post, has not been away since his arrival there as a young man fifty years ago. The remuneration is small, usually $400 or $500, in exceptional cases $1,000 per annum, but their houses, supplies, and servants are paid for by the company, so there is little need for spending their salaries.

French Competition

I have referred to the competition started a few years ago by the Revillon Freres of Paris. Revillon Freres are reputed to be the largest finished-fur manufacturers in the world, and have stations for the collection of raw furs in many parts of the globe, including Asia and northern Europe as well as North America. The entrance of this firm into competition with the Hudson's Bay Company, therefore, probably begins what is perhaps the most serious competition which the Hudson's Bay Company has ever had. Since 1877, when the Hudson's Bay Company ceded to the Canadian government all its governmental rights in northern Canada, the company has had no official monopoly of the fur trade and has owned only a few acres immediately about its posts, maintaining its monopoly largely by the inertia of the business. Having been in control of the fur business for so many years, having developed a spirit of loyalty among the natives, having an extensive plant in a part of the country so inaccessible and so unfavorable to competition, it has been in a most impregnable position. Revillon Freres have, however, quietly and persistently developed their posts, have put capable men in charge, including a number of French army officers, have given every evidence that they are there to stay, and are making serious inroads into the native support of the Hudson's Bay Company. As yet their project has been a very expensive one, but the amount of fur which they are getting is increasing year by year and it seems not unlikely that they will prove themselves formidable rivals of the Hudson's Bay Company. The Hudson's Bay Company has hitherto felt strong enough to meet this competition without general raising of prices. The competition of the two companies has considerably improved the Indian's lot, as he feels that if not treated properly by one company he will be welcomed by the other.

INFLUENCE OF THE MOUNTAINS OF THE BRITISH ISLES UPON THEIR HISTORY

By Benj. A. Stevens, La Crosse, Wis.

THE highlands of Great Britain may be arbitrarily divided into four groups; the Scottish Highlands, the Pennine Range, the Cumbrian Mountains of the Lake Country, and the Cambrians or Welch Highlands. Of these, the Scottish Highlands are naturally divided into three sections: the North-West Highlands, lying to the northwest of Glenmore; the Highlands proper, which occupy all of the region north of the Midland Plain not included in the North-West Highlands; and the Southern Highlands, which lie to the south of the Midland Plain. Of these four great groups but two, the Scottish and the Welch Highlands, have exercised any marked influence upon the history of Great Britain. The other mountains, the Pennines and the Cumbrians are too narrow or too accessible from the lowlands to give rise to any peculiar historic situations of moment.

The characteristics of the Welch and Scottish Highlands which caused them to become important as influences upon the history of Great Britain are their isolation, their infertile soil and unfavorable climate, and the strategic position of the avenues of approach to them from the lowlands.

During the early periods of human life on the island of Britain, that is, during prehistoric times, the above characteristics of the highlands of the North and of the West had a negative influence upon the inhabitants of the island. Having at their disposal extensive lowland plains where the soil was productive and the climate fairly favorable, the Ivernians, who probably were the first settlers of Britain, shunned the mountainous regions where the climate was disagreeable, the soil thin and unproductive, and the freedom of movement and communication interrupted by the frequent barriers of high hills. Nothing but the appearance of a force which would render the more favored lowland districts less desirable to live in than the mountain districts, could drive the early inhabitants of Britain into the highlands. Such a force finally appeard in the form of invading bands of Celts who were migrating from the mainland of Europe.

With the appearance of this superior race of people began the positive influence of the mountains upon the history of Britain. Unable to withstand the invader, the Ivernians retreated to the North and to the West leaving their old homes in the lowland areas in the hands of the Celts. This westward and northward retreat continued until finally the original inhabitants were pressed back into the highland areas where, reinforced by natural forces, they were at last able to beat back the enemy and to establish new homes in security. Thus the mountains began to play their part as the preserver of those weaker races which had once occupied the more favorable parts of Britain.

The Ivernians, after several centuries of undisputed possession of the mountain fastnesses, were joined by the Celts who, like the Ivernians, were driven from the lowlands by a new race of superior men. Giving way before these people, the Britons, who were in fact but another branch of the Celtic race, the Celts retired into the Welch Highlands and into Ireland. From the latter place some of the Celts recrossed to Britain and settled in the South-western part of the Highlands (proper) of Scotland. The two exiled races thus coming into contact in Wales and a part of Scotland soon became friends through their mutual adversity and, uniting by intermarriage, became in time one people.

The role of the mountains as havens of refuge for a defeated and retreating race was not, however, complete after the invasion of the Britons, for once again an invasion took place which drove the Britons in their turn into the highland fastnesses. In their retreat before the Roman forces most of the Britons who did not stay to be the slaves of Roman power withdrew into the Welch Highlands. Few if any joined the Ivernians and Celts in the North. Thus there were three successive races of people, driven from the homes which they had erected on the lowland plains, finding refuge in the great highland regions of the West and North. In their new-found homes they were able for centuries successfully to defend themselves against all attempts to dislodge them.

The force of this fact leads one to inquire, What is the nature of these highland areas which rendered them such safe asylums of refuge for a defeated and inferior people? The answer is alone found in a knowledge of the geography of these districts. Both the Welch and Scottish Highlands are the results of a deeply incised systems of valleys impressed upon ancient plateaus. Both face toward the plains of Britain, presenting steep fronts which are scarred with a few deep valleys. In ancient and medieval times these slopes and valleys were covered with dense forests which added to the natural defence of the regions lying beyond the crests of the hills. In these interior regions a net-work of ridges and valleys ran in a bewildering mass, with here and there lakes and bogs which added further difficulties to travel through the mountain districts. The Scottish Highlands north of the Midland Plain, being more extensive in area than the Welch Highlands, are naturally the most intricate and therefore the most isolated of all of the mountain regions of Britain. Filled as it is with crooks and crannies where a native people can easily evade an enemy, it is not to be wondered at that parts of Scotland were never conquered. It was this isolation, secured through the presence of nearly impassable barriers bordering on the lowland plains of eastern and south-eastern Britain and through the intricately dissected nature of the topography of the highlands themselves, which caused the Welch and Scottish Highlands to become the homes of the remnants of defeated peoples. In addition to preserving the people themselves from being

stamped out or assimilated by their conquerors, the mountains also preserved the racial customs and institutions of the folk which they harbored.

The islolation of these mountain districts had a marked effect upon the people whom they protected. In addition to defending the highlanders it wrought a change in their lives and characters. It developed in them the qualities of courage, thrift, and a suspicion of strangers. The government of the people became largely a clan government and this in itself bespeaks the fervent love of liberty which arose in the Highlander's breast. But isolation was not the only force working a change in the temperment of the mountaineers. The climate and the soil of these highland areas were also instrumental in evolving the new-charactered people who, by the time of the Roman conquest, had become a positive force in shaping much of the recorded history of Great Britain. The thin, infertile soil, rendered less productive by being drenched by the heavy rains resulting from the sudden cooling of the moist winds from off the ocean, the lowered temperature, resulting from the constant evaporation of surface water and the elevation, the short seasons, and the rough surface of the land, caused the highlands to be regions especially unfavorable to agriculture. As a result stock raising became a common industry. But more important than this from the historic viewpoint, was the result upon the character of the people themselves. The difficulties in the way of making an easy living from the soil soon developed in the Highlanders the habit of preying upon their more fortunate neighbors of the lowlands. Raids of this character became frequent at an early time and the highland raiders found nearly as much satisfaction in the revenge which they were taking upon the conquerors of their race as they did in the booty which they carried away to their mountain homes.

The historical importance of these raids can hardly be overestimated. From the beginning of recorded history, i. e., from the time of the Roman Conquest, down to the final union of all parts of the island of Britain under a common government, the raids of the highlanders were numerous and were a thorn in the side of the more powerful and industrious people of the lowlands. These piratical expeditions doubtless began during the supremacy of the Britons, for when the Romans appeared, the onslaughts of the Picts and the Scots* upon the frontier settlements were regular and troublesome. The best indication of the seriousness of these attacks is the fact that the Roman forces found it necessary to erect strong ramparts along their frontier in the Midland Plain and to add the double security of a long wall, now known as Hadrian's Wall, which stretched across the entire width of the island between the Firth of Solway and the mouth of the River Tay. Thus defended,

*Picts and Scots were the names given by the Romans to the people in the highlands of Scotland. The Picts were the Ivernians, and the Scots were the Celts. It is interesting to note in this connection that the name Scotland originated from this Roman name for the people who entered the Scottish Highlands from Ireland.

the Roman arms successfully held in check the barbarians from the mountains. When, however, in 410 A. D., the Roman legions were recalled to the imperial city and the now weak-spirited Britons were left without the defence of the wll-trained soldiers, the raids of the Picts and Scots became more destructive and threatening than ever and, for a time, it appeared as though the lowlands of Britain were to be reconquered by the descendants of its former possessors. The Britons, however, seeing the ever increasing storm brewing in the mountains and fully conscious of their own inability to check its advance, called for help from across the Channel.

The Teutonic Invasion

In answer to this summons came bands of Teutonic people, the Jutes, Angles and Saxons. These sturdy people stemmed the tide of invasion which had begun to flow out of the Welch and Scottish Highlands; but instead of stopping when this task was done they turned about upon their hosts, the Britons, and subdued them. The Anglo-Saxon occupation of the British lowlands followed, only to be disturbed in the 9th century by the invading Norsemen. Throughout the supremacy of the former and the joint occupation of England by both peoples, the mountaineers continued their attacks upon the frontier settlers. Aside from occasional counter attacks by the people of the plain, no effort to eradicate the source of the raids was made. A change, however, was about to revolutionize England.

The Norman Conquest

In 1066 England was again conquered by a foreign invader; this time by the Normans under their king William. The advent of this highly civilized and virile people was followed by a centralization of power and authority which made possible the execution of vigorous attacks upon the wild clansmen of the highlands. William the Conqueror succeeded in invading both Wales and Scotland and even forced the Scottish king to swear allegiance; but permanent or lasting success was impossible when dealing with a people whose policy was to strike sudden blows and then to beat a hasty retreat into the impregnable fastnesses of their mountain havens. The problem which these mountain raiders presented affected materially the reorganization of England which William effected. In transplanting the feudal system into England, William had hoped so to carve and allot the several fiefs as to remove forever the dangers to the Crown which came from a union of strong barons. This ideal of William's worked very well until he came to the territories bordering upon Wales and Scotland. Here he saw that it would be necessary to place what were practically sovereign powers in the hands of several great barons in order that they might act as buffers between the highland districts and the lowland plains of England. These barons became known as the Lords Marchers and they were permitted to maintain

strong standing armies and to govern large counties on the frontier. On the Welch frontier were established the marches of Cheshire, Shropshire, and Herfordshire. On the Scottish border similar great earldoms, like Northumberland, were created. The Lords Marchers were instructed to be prepared to meet and repulse all raids of the highlanders and to return their attacks in an effort to finally subjugate them and to add their territories to the possessions of the English Crown. The presence of these powerful barons did much to lessen the evils of border raids, but the very danger which William foresaw and feared when he created these strong guardians of the peace soon threatened the Crown of England. The Barons upon several occasions rose in revolt and in their attacks upon the Crown they were strongly supplemented by the very people whom they were to subdue. Chief among these uprisings was that in 1399, when Owen Glendower, a Welchman attempting to reestablish the independence of Wales, joined with the earls of Northumberland, Worcester and Douglas in their revolt against the authority of the English Crown. This rebellion was finally put down but raids and conspiracies continued along the borders, especially the Scottish border, until the final union of the crowns and the parliaments of Scotland and England in 1707. *Thus, for over seventeen hundred years did the raiding expeditions of the highlanders play an important part in the making of the history of Great Britain.*

As one might easily imagine, the effect of these raids was not solely to put the natives of the lowlands on the defensive. Offensive expeditions were often sent out to pursue the impudent highlanders and to effect, if possible, the conquest of their mountain fastnesses. The dispatching of such expeditions with their results logically brings us to the last great geographic factor influencing the history of Great Britain; that of the strategic position of the avenues of approach into the highland regions.

The English Conquest of Wales

Of the two highland regions, Wales was the more accessible due to its smaller area and to the greater number of passes into it. Its central highlands are tapped by a number of valleys which, cut out by the head-waters of the Severn River, slope to the eastward. To the south of the mountains runs a fairly wide coastal plain along which access to the western coast is relatively easy. To the north runs another coastal plain, narrower than that to the south. The connection of this plain with the west is, however, cut off by the Snowdon Mountains in northwestern Wales. These mountains also extend westward nearly to the coast. Hence, guarded from approach by either the northern or the western coastal plains, the region to the north-west of the Snowdons is an extremely isolated part of Wales, in fact, the most isolated of any of its parts. This district, known in ancient times as Gwyneth, was the last of the Welch strongholds to fall before the Norman kings.

In the invasion of Wales, little was accomplished prior to the Norman Conquest. After William's subjugation of England he directed a blow at Wales but without any marked effect. In the next century Henry II flung armies into Wales upon three occasions but all these attempts were failures. The pioneer work of conquering the Welch mountaineers was not to be done by the Crown, but was accomplished by the Lords Marchers located on the Welch border. These individuals, in their counter attacks upon the highland raiders worked up the valleys of the Severn tributaries and along the southern and northern coasts until by Edward I's reign they had subdued all of Wales except the province of Gwyneth. In this well protected corner of the Welch Highlands the last of the independent Welch evaded the enemy successfully by retreating up the Snowdons when attacked. All attempts to starve them out were fruitless, for but a short distance off shore to their rear lay the island of Anglesey from which provisions could be secured in abundance. With the accession of Edward I to the throne of England came, however, the death-knell of this last stronghold of a brave and independent people. Edward determined to accomplish the downfall of this last source of disturbance in Wales. Leading an army by the northern coastal plain and sending his navy to occupy the strait separating Anglesey Isle from the mainland, Edward succeeded in besetting the Welch from front and rear. Thus surrounded, the fate of the brave defenders in the Snowdons was sealed. Surrender and British rule was all that remained for them. In this manner was stamped out the last trace of Welch independence which the highlands had fostered and maintained for centuries. Wales was conquered because of the natural weaknesses in its strategic position resulting from the presence of a number of fairly easy avenues of approach into its highland areas. Scotland, however, was not to be thus betrayed by Nature.

The Natural Strength of Scotland

In the consideration of the strategic position of the avenues of approach into the Scottish Highlands, the passes of the Southern Highlands will not be considered, for, although they were the sites of several notable battles and figured to some extent in the affairs of Britain, they never were a decisive force in influencing the history of the island. Lying between two great lowland areas and cut by several convenient passes, they never became a serious hindrance to the advance of the power of the nation inhabiting the lowlands of England.

The approach to the highlands north of the Midland Plain was, however, from the beginning of recorded history in Britain down to 1707 a constant challenge to invading forces and the strength of Highland Scotland's secure and impregnable position. But one practical route was available for movement into the Highlands north of the Midland Plain. A succession of low hills, the Campsie, the Ochils and the Sidlaws, extending from east to

west across the northern part of the Midland Plain or Great Rift Valley, is the first barrier to be encountered in an advance toward the Highland area. Through these hills there is but one convenient pass, namely, that made by the River Forth between the Ochils and the Campsies. This pass being at the head of the only route to the Scottish Highlands early became an avenue of great strategic value. On its site the Scots erected a strong castle, Sterling Castle, and for the possession of this important fortification, several memorable battles were fought including that of Bannockburn. North of this important pass the pathway into Scotland led along the eastern coastal plain to the eastern end of Glenmore. Along this highway an invading army, which had succeeded in passing the first barrier at Sterling, was further liable to obstruction on a march to Glenmore by narrow places in the plain where the Scots upon the higher ground could offer a stubborn resistance. Chief among these points of strategic advantage was the region about Dunbar. Here the Highland forces met Cromwell while he was on his expedition to effect the subjugation of Scotland. With more valor than generalship the Scottish army gave up the vantage point which they held and descended to the plain where they met defeat at the hands of Cromwell's well trained army. As to the strategic value of Glenmore little can be said, for no army of invasion ever attempted to use it as a means of entering the highlands. The union of Scotland and England came before any English army reached either of its termini with a force strong enough to attempt the expedition. After the union it did become important as a means of crushing insurrections and eventually in breaking up the clan system in the remote highland areas. Three forts were erected along this great valley in order to preserve the peace. There is no doubt but what Glenmore was to the Scotch what Menai Strait was to the Welch only it was much stronger in being impossible of investment from the sea. The Scotch Highlands also had the advantage over the Welch Highlands in that the central part of its highlands are, with but one exception, free from the easy valley routes which tap the Welch mountains, and further, approach along a coastal plain is limited to but one route in Scotland whereas Wales is nearly circumscribed by such lowlands. These facts easily explain why Wales fell before the power of England while Scotland was long able to remain unconquered.

Thus, from almost the beginning of human life in the highlands of Great Britain down to the present time, the isolation of the highlands, their climate and soil, and the strategic position of the avenues leading into them have all, either singly or collectively, been an important factor in shaping the history of Great Britain.

INFLUENCE OF THE PHYSICAL FEATURES OF SCOTLAND UPON THE PEOPLE

(From Geikie's "The Scenery of Scotland.)

"THE connection between the physical features of a country and the history and temperament of its people has hardly received, from either historians or geologists, the attention which it deserves. Though not obtrusive, it is real and close, and amid other and more potent influences has never ceased to play its part in the moulding of national character and progress. It may be seen (1) in the distribution and migration of races; (2) in the historical development of a people; (3) in industrial and commercial progress; and (4) in national temperament and literature. I propose briefly to refer to the illustrations which these questions receive in Scotland.

(1) "The fundamental distinction between highlands and lowlands has had a powerful effect on the wanderings and ultimate grouping of the different races of mankind. Nowhere can the influence of this topographical contrast be better observed than in Scotland. The Scottish Highlands, sharply defined against the Lowland plains, and washed around their other sides by the stormy Atlantic Ocean, offered in rude times a wild and almost inaccessible asylum against invasion. There the original Gaelic population has been able to maintain itself, while wave after wave of hostile immigrants has broken against the bases of the hills. The Cymri, who came after the Gaels, possessed themselves of the southern part of the country; but they do not seem ever to have advanced beyond the limits of their Strathclyde territories. The Romans carried their conquests up to the borders of the Highlands, but there was nothing among those dark mountains to invite them farther. They marched into the northern wilds, indeed, but it was rather for vainglory and to punish their savage assailants than with the view of permanent occupation. And so tracing their wall and planting their forts across the narrowest part of the island, they were content to let the Highlanders keep their fastnesses.

"When the next wave of conquest brought successive hordes of Norsemen and Danes from beyond the sea to our shore, the same physical features, which had guided and limited the march of the southern invaders, once more set bounds to the progress of the Vikings from the north.

"The lowlands of the northern counties and of the Midland Valley lay open to the war-boats of the pirates, and there, driving out or absorbing the Celtic population, the Teutons firmly planted themselves. But they never pushed their way far into the mountains. Down to this day, in spite of the slow but unceasing diffusion and amalgamation of the races, the geological boundary between the rough ground of the crystalline schists on the one hand, and the drift-covered plains of the Moray Firth on the other, is still in great measure the boundary of the Gaelic-speaking and English-speaking popula-

tions. On these fertile lowlands, we hear only English spoken, often with a northern accent, or with some northern words that seem to remind us of the Norse blood which flows in the veins of the hardy fisherfolk and farmers. We there come upon groups of villages and towns. The houses, though often poor and dirty, are for the most part solidly built of hewn stone and mortar, with well-made roofs of thatch, tile, slate, or flagstone. The fuel in ordinary use is coal, brought by sea from the south.

"But no sooner do we advance within the Highland districts of the crystalline schists than all the human associations of the ground, as well as its physical aspect, appear changed. Gaelic, though slowly dying out, is still over wide regions the vernacular tongue. There are few or no villages. The houses, built of boulders gathered from the soil, and held together with mere clay or earth, are covered with frail roofs of ferns, straw, or heather, kept down by stone-weighted ropes of the same materials. Fireplaces and chimneys are luxuries not yet universally adopted, and the pungent blue smoke from fires of peat or turf finds its way out by door and window, or beneath the begrimed rafters. The contrast of geological structure and scenery which allowed the Teutonic invaders to drive the older Celtic people from the coast-line, but prevented them from advancing inland, has sufficed during all the subsequent centuries to keep the two races apart."

Speaking of the influence of environment upon national temperament, Geikie says, regarding the differences manifest in the Irish Celts and the Highland Celts of Scotland, "I am disposed to regard this difference in temperament as traceable in great measure to the peculiar condition of the Highlander's environment. Placed in a glen, often narrow and rocky, and separated from his neighbors in the next glens by high ranges of rugged hills, he has had to contend with a scant and stony soil, and a wet, cold, and uncertain climate. He has to wage with the elements a never-ending battle, wherein he is often the loser. The dark mountains, that frown above him, gather around their summits the cloudy screen which keeps the sun from ripening his miserable patch of corn, or rots it with perpetual rains as it lies week after week on the sodden field. He stands among the mountains face to face with nature in her wilder moods. Storm and tempest, mist-wreath and whirl-wind, the roar of waterfalls, the rush of swollen streams, the crash of loosened landslips, which he may seem hardly to notice, do not pass without bringing, unconsciously perhaps, to his imagination their ministry of terror. Hence the playful mirthfulness and light-heartedness of the Celtic temperament have, in his case, been curdled into a stubbornness which may be stolid obstinacy or undaunted perseverance, according to the circumstances which develop it. Like his own granitic hills, he has grown hard and enduring, not without a tinge of melancholy, suggestive of the sadness that lingers among his wind-swept glens, and that hangs about the birken slopes around his lonely lakes."

common practice of teaching the rainfall of each continent as a fact subject adds a great array of confusing data to the stock in hand. On the other hand if the various reasons for rainfall are considered, such as windward and leeward sides of mountains, wind belts, their migrations and the like, then when the facts of location are known, the distribution of precipitation becomes an example to be solved. This process has a double value; first, if problems are presented which can be solved only by knowing the facts about a country an incentive is offered for learning the facts carefully and, second, it teaches the children how to make use of their knowledge and this, after all, is the main reason for keeping school.

While it is possible to indicate the general line of procedure in dynamic geography the actual desiderata can not be so definitely listed as can the facts of place geography and moreover it is not altogether desirable to do so, for the teacher must in the long run be more than a task master. Type presentations in regional geography have illustrated for the teacher a pathway but as yet regional geography in its fuller aspect, finds little place in the grade schools. The allied branch of economic geography also offers a large field for the teacher who understands the principles of the subject. In either sub-division an inventive teacher may find innumerable problems which will give the breath of life to the geography lesson.

Therefore the publishers of minimum requirement lists in geography ought to state definitely their point of view. If they believe that a list of place names only should form the geographic equipment of their charges, one of two things is necessary, either to make the list very long in order to cover the time allotted to geography in the grades and thereby revert to the errors of earlier teaching or, if the list is a reasonable one, to cut down the time requirement. Then let them turn to some of our recent books on education and see how insufficiently the task which has been set meets the requirements of the ends of education. If, on the other hand, the list of place names is supposed to be the basis merely of dynamic geography the teacher must be made to understand that while perfection in the items is required, time must not be wasted in the achievements of memory alone. Then, directors can concentrate their attention on the formulation of courses of study which will suggest the true nature and scope of geography. With so little attention paid to the dynamic side and therefore so little general experience it is unwise to attempt, even if it could be done, any limits comparable to the minimum requirements of static geography. As time goes on however not only will there be a chance for choice but definite ways of testing the capacity of the pupils and the efficiency of the teaching will be revealed. At all events those who have liked the sound of the minimum requirement suggestion or have been infatuated by the efficiency doctrines should understand the full meaning of the movement in any particular branch before attempting reforms, lest disaster overtake them.

SOME GEOGRAPHICAL ASPECTS OF THE PRESENT EUROPEAN WAR

EUROPE has been in a state of unstable equilibrium for centuries. Many boundary lines between European nations are purely arbitrary; they were fixed as the result of wars in which the loser was forced to accept such terms as the victor would grant; but such boundaries are seldom regarded as final by the losing nation, nor are they likely to prove permanent, since they are determined by no natural cause.

As long as English kings attempted to hold territory in France, there was constant trouble, centuries of warfare. When the United Kingdom came to be limited by the natural boundaries which now define it, France and Britain were in position to become friendly. Old animosities were not immediately forgotten but since the chief cause of their existence, unsatisfactory boundary adjustments, had largely disappeared, it was only a matter of time when the two old enemies might become friendly. In the Crimean War they fought on the same side, and Great Britain entered the present war largely to aid her ally, France, once her hated enemy. The state of tension which has existed between Germany and France since the Franco-Prussian War was the result of the taking of Alsace-Lorraine, and thereby the establishment of a boundary line unsatisfactory to one power. If a range of mountains such as the Pyrenees or a body of water such as the English Channel had been available as a boundary between France and Germany, it would, by force of its appropriateness, have been accepted, in course of time, by both nations.

The present war began in the Balkans. For a generation or two, it has been evident that the Balkans are a Prince Rupert's Drop, a region in a state of tension because every boundary line in the peninsula was drawn more or less arbitrarily, and was forced upon the several countries by outside powers; since few of the boundaries have any natural cause, few of them have been accepted as final by the nations concerned. Moreover, the mountainous character of the peninsula and its geographical position in the southeast of Europe have made it a refuge for a variety of races, none too friendly under any conditions, but kept from an easy and friendly intermingling through the difficulties presented by the physical features of the peninsula. Had the Balkan peninsula been part of the Russian plain, it is quite likely that the various races would have mingled and to a degree, amalgamated and that they would have been absorbed into the Russian Empire just as other parts of the plain were. Much of the tension which has long existed in Europe has arisen from the determination of certain European powers to force upon other countries unnatural and unacceptable boundaries. If the Ottoman Empire has any appropriate boundary, it is not the absurd one arbitrarily determined by the Powers at the close of the late Balkan War, but it is that boundary which has long been accepted as the separating line between Europe and Asia. No

more can there be peace in the Balkan Peninsula so long as the Turk rules any part of it than there could be in Spain while the Moors ruled a part of it. When the Moors were driven back into Africa, and even so narrow a water boundary as the Strait of Gibraltar separated them from Europe, things assumed a more settled condition. There is no escape from the logic of a nature-fixed boundary line. Nations will often accept such, when they will not permanently accept any other.

Everyone recognizes that Russia will never rest until her unnatural and unbearable condition with reference to open ports is relieved. Either Russia must be allowed an outlet or she must be reduced to impotency. It will not be surprising if, in the adjustments following the present war, Russia insists upon concessions of this nature which, heretofore, the powers have denied her; this assumes that Russia is on the winning side. If she should be on the losing side, her situation will be made still more unbearable and the tension will continue.

Both Belgium and Holland are maintained as independent nations in defiance of their geography. How little the neutrality of Belgium was respected when the violation of that neutrality became advantageous to Germany, is seen in the action of Germany on the very first day after hostilities began. Holland's neutrality will not be respected if any of the great powers in the present conflict find it to their advantage to violate it. Yet, there is much less danger to Switzerland, and the difference lies in the geography of the respective countries.

The present struggle is a sad commentary on our civilization, on our boasted, advanced civilization. But evidently the struggle had to come. Evidently force, not reason, still rules or intends to rule. Perhaps Europe can learn in no other way. Perhaps the hollow and specious motto of the war party in every country—"The way to preserve peace is always to be prepared for war"—will now be shown in its true light. It is not necessarily true that there can be no permanent peace among nations so long as their boundaries are fixed by force or politics instead of by nature, but it is true that men and peoples are more willing to accept boundaries which have their logic in natural or geographical conditions than they are to accept boundaries which are purely arbitrary.

Many factors of many kinds are involved in this great European struggle; some of these are purely political, some are psychological, but the underlying ones are essentially geographical. R. H. W.

The Geographical Society of Chicago is performing valuable service in its publications, the last of which is "The Weather and Climate of Chicago," by Henry J. Cox and John H. Armington. This is the fourth volume issued under the auspices of the Chicago society.

SUGGESTED MEANS OF MEASURING EFFICIENCY IN THE TEACHING OF GEOGRAPHY

By R. H. Whitbeck, University of Wisconsin

EFFICIENCY in the teaching of geography, like that in the teaching of other studies, may be measured by three tests:

(1) INTEREST,—

the degree of interest in the subject which is developed in the pupils and which manifests itself both in their attitude in the class and in their desire to read and to see more of the real things with which the study deals.

I have seen this test applied successfully in the following way: The teacher placed on her desk a number of geographical readers, books of travel, and geographical magazines, from which she had made a list of articles or chapters which furnshed interesting supplementary matter along the line of the study which the class was then pursuing. The teacher simply said to the pupils, "I have posted here a list of interesting readings, and I have the books from which these readings are selected, on my table. If any of you desire to take a book home for a day or two, you may do so by applying to me at the close of school." Nothing more was said. The number of pupils who applied for books, and the evidence that they read these, was taken as an index of the amount of interest which pupils had developed or were developing in the subject. I noted that there was an intimate connection between the efficiency of the teacher's work and the number of pupils who asked for these books and magazines, as naturally would be the case.

(2) KNOWLEDGE

This is of two kinds:—

(a) Specific and accurate knowledge,

(b) General knowledge.

The field of geography is very broad and there is constant need of differentiating between that relatively small body of fundamental knowledge which ought to be known accurately, and on the other hand, that larger body of useful geographical knowledge which is valuable, though not strictly fundamental or essential. The teacher needs help (through a syllabus) in determining what facts shall be emphasized, drilled, and reviewed, and what ones may be discussed more or less informally in the class but not drilled or reviewed, at least to any considerable extent.

Efficiency in teaching geography will result in a very large proportion of pupils knowing thoroughly and surely this smaller body of essential knowledge.

(3) POWER

Measured by the pupil's ability relative to his age:

(a) to use his geographical knowledge in judging and reasoning along geographical lines;

(b) to visualize maps,—that is, to call up mental map-pictures and to see parts of the world in their correct place relations. The only way in

which we can visualize large regions of the world is through these mental map-pictures, hence the importance of thorough map-studies;

(c) to use common reference books such as the atlas, gazetteer, encyclopedia and possibly a few others.

The following suggestive questions or exercises are given as illustrations of a method of applying the tests referred to above. The power to use geographical knowledge in forming judgments and in reasoning may be tested by such questions as the following:

(a) Suggest explanations for as many of the following facts as you can:

(1) There are places in the torrid zone where even in summer it is as cold as in Labrador.

(2) Hammerfest, Norway, is in the frigid zone, yet its harbor is never frozen over while the St. Lawrence River is closed by ice for several months each winter.

(3) We have our winter when the earth is nearest the sun.

(4) The little country of Holland has a larger foreign trade than the great country of Russia.

(5) In Nome, Alaska, there is light enough in summer to permit the reading of a newspaper at 10 P. M.

(b) Another type of questions may be illustrated by the following:

(1) What three or four countries of Europe would suffer most if all trade with foreign lands were cut off? Give reasons for your answer.

(2) Germany maintains a great army and Great Britain a large navy. Account for this difference.

(3) In general, the average production of wheat per acre diminishes as you go from central Russia towards the east. Give several reasons which might explain this. Which do you consider the main one?

(c) Power to call up mental map-pictures may be tested by such questions as the following:

(1) Sketch a map of South America and place upon it in their proper positions,

a—the equator
b—the Amazon River
c—the Orinoco River
d—the northern boundary of Chili
e—Buenos Aires, Rio Janeiro, the coffee district of Brazil.

(2) Tell as accurately as possible in what direction

a—Berlin is from London
b—Panama is from Florida
c—Nova Scotia is from England
d—Cuba is from New York
e—France is from Philadelphia.

(d) Ability to use books of reference may be tested by such questions as the following: If you wish to find quickly the following information, tell in each case what you would do or where you would look for it:

(1) the pronunciation of *Rio Janeiro*
(2) The population of London
(3) How coffee is cured for market
(4) The approximate distance from New York to Panama
(5) What and where is Chad?
(6) How to go by rail from Chicago to New Orleans
(7) Name of the present king of England
(8) The area of Switzerland.

In my judgment an examination which reveals efficiency in teaching will involve questions of each of the above types. Tests to show the efficiency of teaching will, of course, vary with the maturity of the pupils. In the grades below, say, the 7th, the pupils' interest and knowledge are more legitimate measures of efficiency than is their power. In grades 7 and above, power to think and reason and ability to sketch memory maps or fill in outline maps and to use reference materials, is of increasing importance.

A COMMUNICATION

Editor of The Journal of Geography—

At the St. Paul meeting of the National Education Association the need of a national organization of Geography teachers became apparent and the organization of such an association was suggested. We have no association devoted to the educational phase of our science, and at most educational meetings, Geography discussions are therefore little more than side issues. Is there not need of a National Association of Geography Teachers to encourage the expansion of the science in our schools, to better what is now taught, and to unify ideals among teachers? Such an organization should be affiliated with some other existing body of teachers, such as the N. E. A. or the Association of American Geographers.

It seems highly desirable to follow up the idea expressed at the St. Paul meeting. Therefore, I beg to suggest that you ask for an expression of opinion, through the Journal of Geography, requesting that all teachers of Geography who favor such an organization communicate either with the Journal or the undersigned. Why would it not be a good time to effect a temporary organization at the Chicago meeting of the Association of American Geographers next December?

Very truly yours,

George J. Miller,
State Normal School, Mankato, Minn.

Editor's Note.—We believe the above suggestion is worthy of careful consideration and we hope that many teachers will respond.

NEWS NOTES

Prof. Amos Farnham, for many years teacher of Geography in the Oswego, N. Y., Normal School, has an article on "The Land of Bohemia" in the June number of *The Vocationist*. Regarding the word Bohemia, Prof. Farnham says: "The term Bohemia has an unfortunate use, which use is the only one understood by many intelligent people. Long ago a vagabond race came from India and scattered over Europe, hence over Bohemia. Later the descendants of this race came to America from different European countries including Bohemia. They were called Bohemians. They lived by theft, fortune-telling, tinkering, and trading horses. These vagabonds are still in our midst and are called Bohemians, when they are not called gypsies. They might with the same propriety be called Bavarians, Hungarians, or after any other country which they had infested, and from which they had emigrated to our shores."

Prof. R. DeC. Ward, of Harvard, published in the January, 1914, *Monthly Weather Review* a highly interesting Appreciation of Lorin Blodget's "Climatology of the United States." Prof. Ward's article includes many excerpts from the book. Of this volume he says: "More than ever before, I am impressed by the labor involved in the preparation of this book; by the author's broad and clear view of his subject; and by the practical application of the facts. My rereading of this book has given me new light on my path as a teacher. And I hope that this notice may turn attention once more to the importance of Blodget's work for American climatology, and may help to preserve for this almost forgotton author of 50 years ago the place to which he is entitled among American meteorologists."

Reports from the summer schools indicate a widespread growth of interest in the Geography courses. The Cornell enrollment was one-third larger than last year. W. M. Gregory reports over 100 teachers in his geography classes at the Peabody College for Teachers in Nashville. The registration in geography classes at the University of Wisconsin was more than double that of any previous year, and Chicago's enrollment increased nearly fifty per cent over 1913.

President Gould and Secretary Lange of the Geographical Society of Wisconsin, have arranged the program for the annual meeting of the Society at Milwaukee next month. Among the speakers announced are Professors Goode, of the University of Chicago, and Martin of the University of Wisconsin. Professor Goode will also deliver an address on Geography at one of the big general sessions of the Wisconsin Teachers' Association.

Gannett, Garrison and Houston's *Commercial Geography*, originally issued in 1905 (American Book Co.), has been revised and the statistical matter brought down to 1910 or later.

Two papers on the subject of Geography-teaching were presented before the Science Section of the National Education Association of Saint Paul; one by R. H. Whitbeck on "Geography Teaching in City High Schools," and one by W. J. Sutherland on "Geography Teaching in the Smaller High Schools."

NEW YORK STATE (REGENT'S) EXAMINATION IN GEOGRAPHY

New York has uniform examinations throughout all of the schools of the state, held on the same day and hour in every school. The following examination is the final test for "passing" pupils out of grade school geography; 75 is the passing grade. Ten questions must be answered.

1. In what continent is *each* of the following mountains: Andes, Rocky, Alps, Himalaya, Appalachian? Tell in what general direction each extends.

2. Tell what *each* of the following is and give its location: New Zealand, Caribbean, Victoria Nyanza, Steppes, White House.

3. Give the general direction of *each* of the following rivers and name the body of water into which each flows: Connecticut, Amazon, Thames, Ganges, Nile.

4. Locate by states the following cities: Boston, Chicago, Philadelphia, New Orleans, Detroit, Pittsburg, Cincinnati, Atlanta, Lincoln, Seattle.

5. Compare the climate of the northwestern coast of the United States with that of the northeastern coast in the same latitude. Give reasons for the difference.

6. Name *three* kinds of soil. Tell *two* ways in which nature transports soil.

7. Mention *four* conditions that modify the climate of a place.

8. Write at least 75 words on *Dairy Farming,* describing it briefly, giving the conditions that make it profitable and naming the products.

9. Name the five races of men. Describe *one* of these races.

10. Give *one* important fact about *each* of the following: (*a*) Waterloo, Belgium, (*b*) St. Helena, (*c*) Saratoga, (*d*) Genoa, (*e*) Rome, Italy.

11. What is meant by water storage? What benefits will come to the industries of this state through water storage?

12. Give *one* important reason for the growth of each of *three* of the following: (*a*) Schenectady, (*b*) Niagara Falls, (*c*) Montgomery, Ala. (*d*) Nome, (*e*) Duluth, (*f*) Seattle.

13. Draw an outline map of New York State. On this map indicate, with names, *five* water boundaries of this state.

14. Name and locate the following in New York State: (*a*) *two* rivers that furnish important water power, (*b*) *two* places where important battles have been fought, (*c*) the highest mountain.

15. Name *one* famous business street, *one* famous residence street, the *two* largest parks and *two* means of rapid transit in New York city.

Examination Questions for the Intermediate Certificate in South Australia

Geography.

Candidates must attempt only five questions, viz., 1, 2, 3, and any other two.

1. Explain the meaning of the following terms with reference to Australian meteorology. Illustrate your answer by sketches, inserting barometric readings and winds:—Cyclone, monsoon, "V"-shaped depression.

2. State what and where the following are, and give interesting facts about each of them:—The Rand, Birdsville, Alberta, Darjeeling, The Great Karroo, Minneapolis, Perim, La Paz, Buluwayo, Rotorua.

3. Give a general description of the natural resources, exports, and distribution of population of either China or Canada.

4. What effects do you consider the opening of the Panama Canal will have on the trade of the world?

5. State where the following products are chiefly found:—Gold, oil, silver, jute, sulphur, diamonds, tin, quicksilver, platinum.

6. What States are wholly or mainly drained by the Rio de la Plata? Draw a fairly large map showing the principal rivers which unite to form it. Mention the occupations of the inhabitants of the watersheds of these streams.

7. What are the chief volcanic regions of the world? Mention anything of interest you have noticed with regard to the positions of these regions.

8. Name, in order of importance, the chief wheat-growing countries of the world, and state their comparative advantages and disadvantages for the development of that industry.

Commercial Geography.

1. Name the chief producing countries of the following:—Rubber, asphaltum, cinnamon, mahogany, cotton, opium, cinchona, tea.

2. Specify *five* marked illustrations of man's skill in overcoming adverse physiographic conditions for the purpose of promoting material welfare.

3. Name the principal imports into the Commonwealth of Australia from the following countries:—India, Canada, and Java. What commodities are sent to these countries from Australia?

4. Locate the Suez Canal, Kiel Canal, Welland Canal, and state what special advantage to commerce each contributes.

5. Write *full* notes on the situation and commercial importance of *Chicago, Singapore, Genoa.*

A Little Book on Map Projection by Mary Adams was issued during the past summer by George Philip and Son, London. (50 cents). It is intended for use in secondary schools and normal schools.

RECENT PUBLICATIONS

THE TRADE OF THE WORLD. By James Davenport Whelpley. 436 pp. 80 illustrations on plate paper. The Century Co., N. Y., $2.00 net, postage extra. Published October, 1913.

The title does not closely fit the book. The author has traveled widely, has resided in most, if not all, of the countries of which he writes, and is intimately acquainted with his subject. The style is easy, the matter interesting, but by no means confined to matters of trade. The treatment is on a broad economic basis, dealing with resources, transportation, condition of the people, foreign relations, etc. Great Britain, Germany, France, Belgium, Austria-Hungary, Italy, North Africa, Japan, China, Russia, Argentina and the United States are the countries which are considered. One chapter deals with the interesting theme, "If Canada were to Annex the United States." The opening chapter discusses "Trade Strategy; a 34-billion dollar Stake in Commercial Diplomacy," and is an illuminating chapter, particularly valuable for students of Commercial Geography, and candidates for the consular service. Statistics are sparingly introduced. The treatment is analytical and interpretative, and is enriched with a wealth of concrete illustrations drawn from the author's wide experience.

THE CLIMATE AND WEATHER OF CHICAGO. By Henry J. Cox and John H. Armington. The University of Chicago Press. pp. xxv+375. $3.00 net. Transportation extra: weight 3 lbs., 1 oz. (1914).

This is Bulletin No. 4 of the Chicago Geographical Society; a large part of the cost of publication was met by the contributions of generous Chicagoans. The book is divided into eight parts, namely, Temperature, Precipitation, Atmospheric Moisture, Cloudiness and Sunshine, Wind Direction and Velocity, Barometric Pressure and a Conclusion. There are 147 tables, 9 plates and 99 figures.

The volume plainly represents an enormous amount of work, done in a thoroughgoing way. No critical review is here attempted, for such a review should be made only by a specialist in Meteorology. A book of this sort is a distinct credit to the scientific spirit of the writers, who have given so largely of their time, and to the enterprise of the Chicago Geographical Society, which has secured its publication.

How Man Conquered Nature is a recent issue in Macmillan's "Everychild's Series," (40 cents). The author is Minnie J. Reynolds. As a supplementary reader, it forms an introduction to the study of Industries and Industrial Geography. Typical chapters deal with—First Manufactures, How Man got the Food Plants, The Story of Man's Clothes, What the Mineral World Furnishes, The Growth of Civilization through Trade, and Why our Race has Conquered. There are 250 pages and a few illustrations.

THE PHILIPPINE ISLANDS

There are 3141 islands of which 2775 contain less than one square mile.

About 500 miles from the coast of Asia. Entirely within the tropics; total land area is 115,026 square miles, equal to two Wisconsins. Mainly of volcanic origin, and very mountainous. Highest elevation, 8868 feet.

Monsoon climate with six months rainy season beginning in April.

Earthquakes and tropical hurricanes are frequent. Twelve volcanoes have been in eruption in historic times.

Total population, about 8,000,000 of which 7,000,000 are classed as civilized or partly so. The 8 civilized tribes are Roman Catholic, and the 16 smaller wild tribes are either Mohammedans or are in varying stages of barbarism. Half of the people live in Luzon.

Largest export is cocoanut oil; nearly 400,000,000 pounds in 1912.

Have a monopoly of Manila hemp, which grows wild and has never been successfully raised elsewhere.

Sugar is not likely to become a great product on account of lack of capital and efficient labor, and because of a law which prevents the acquisition of large plantations.

The fourth export, in value, is tobacco.

Coffee has ceased to be of importance, due mainly to a disease which attacked it.

Rice, the principal food, is widely grown, but in addition, hundreds of millions of pounds are imported.

Bananas are the commonest and cheapest fruit; more than 50 varieties are produced in the archipelago.

Agriculture, crude and primitive, is the chief occupation, but the farmers are not prosperous. Only one acre in 30 is cultivated.

One-third of the world's supply of copra, the dried meat of the cocoanut, comes from the Philippines.

The public forests cover 40,000,000 acres, two-thirds of the area of the islands. They could yield $30,000,000 a year under scientific management, yet they do not supply the home demand.

Coal of low grade is mined, but the folding and faulting of the strata makes mining difficult.

Corn is brought from Rosario, Argentina, to New York at about the same freight rate as the railroads charge from Buffalo to New York. From September to December, 1913, we imported from a half million to two and one-third million bushels of corn each month from Argentina; and this in spite of the fact that the United States produces two-thirds of the corn grown in the world.

OUR TIMBER SUPPLY

(From U. S. Government Bulletins)

Amount and Ownership

The total amount of standing timber in the United States is close to 2,900 billion board feet.

At least 76 per cent of this, or 2,200 billion feet, is privately owned.

About 21 per cent, or 600 billion feet, is in the National Forests.

About 3 per cent, or 90 billion feet, is in some other form of public ownership—Federal, State, or municipal.

The original stand of timber in the United States has been roughly estimated to have been 5,200 billion feet, covering approximately 800,000,000 acres.

Fire has destroyed at least as much of this as lumbering has utilized.

As much again has been wasted.

Where It Is

Almost five-elevenths of the country's timber is in the Pacific Northwest (Washington, Oregon, Idaho, and northern California), where the chief trees are Douglas fir, western red cedar, western yellow pine, sugar pine, larch, and redwood.

Of the remaining timber, a little more than half, or about one-fourth of the total supply, is in the Southern pine region (Louisiana, Mississippi, Arkansas, Florida, Texas, Alabama, and parts of Georgia, North Carolina, South Carolina, Virginia, and Missouri), where the principal trees are longleaf, shortleaf, and loblolly pine (all marketed under the name of yellow pine), cypress, and gum, oak, and other hardwoods.

The Lake States contain perhaps 100 billion feet of timber, mostly white, jack, and Norway pine, hemlock, balsam, beech, birch, and maple.

The Northeastern States are the chief source of supply for spruce, from which most of our paper pulp is made.

Most of the National Forests are in the mountains of the West, following in general the Rocky Mountains and Pacific coast ranges from Washington, Idaho, and Montana to southern California, Arizona, and New Mexico. A few are in Arkansas, Florida, Nebraska, Michigan, Minnesota, Alaska, and Porto Rico.

States which have set aside forest reserves of their own are California, Connecticut, Indiana, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, South Dakota, Vermont, and Wisconsin.

Annual Cut

The annual cut of sawtimber in the United States is approximately 43 billion feet.

At this rate, if there were no new growth, our present timber supply would last about 65 years.

Though it contains practically half of all the standing timber in the country, the Pacific Northwest at present furnishes only one-sixth of the annual cut.

The southern pine region is the present center of the lumber industry, furnishing about 45 per cent of the annual production.

The Lake States, once the center of lumbering, now supply a relatively small amount of timber as compared with the Southeast, and less than the Pacific States.

In 1912 the chief lumber-producing States, in the order of their importance, were Washington, Louisiana, Mississippi, North Carolina, Oregon, Texas, Arkansas, Virginia, Wisconsin, Michigan, Minnesota, Alabama, West Virginia, California, and Florida.

Yellow pine furnishes more than 37 per cent of all our lumber, and Douglas fir more than 13 per cent.

Washington supplies the most Douglas fir and western red cedar; Louisiana, the most yellow pine, tupelo, and cypress; Mississippi, the most cottonwood; Arkansas, the most hickory and red gum; Wisconsin, the most basswood, birch, and hemlock; Michigan, the most beech, elm, and maple; Minnesota, the most white pine; and West Virginia, the most oak, yellow poplar, and chestnut.

The people of the United States use in a normal year about 40 billion feet of lumber; 90,000,000 cords of firewood, 135,000,000 hewn railroad ties, 889,000,000 posts, 3,500,000 telegraph and telephone poles, 1,686,000,000 staves, 136,000,000 sets of heading, 353,000,000 barrel hoops, 3,300,000 cords of native pulp wood, 165,000,000 cubic feet of round mine timbers, and 1,250,000 cords of wood for distillation.

The yearly growth of wood in our forests has been estimated to average not more than 12 cubic feet per acre. We are taking out about 36 cubic feet per acre, and are therefore cutting the forests three times as fast as they grow.

Future Supply

Through the inevitable economic development of the country, the amount of land chiefly valuable for growing forests may be expected to shrink from its present extent of 550,000,000 acres (including farm woodlots) to approximately 450,000,000 acres, or, assuming a population of 150,000,000, to 300 acres for every 100 inhabitants.

To maintain our present per capita consumption of 260 cubic feet of wood, however, there would have to be 2,166 acres of forest for every 100 inhabitants, or more than seven times the probable future area.

The present forest area is 775 acres for every 100 inhabitants. It meets our own needs only because it still offers a supply of virgin timber, the accumulated capital of centuries, to supply the deficiency.

With increasing scarcity as this supply is drawn lower, economy in the use of woods will be forced. As wood becomes more expensive, growing it will become more profitable. Thus eventually a balance between production and consumption will be reached.

A supply of wood sufficient for our future needs will be the result of:

1. Reducing the per capita consumption.
2. Protecting the forests from fire.
3. Increasing the annual growth per acre through the practice of forestry.

By greater economy in the use of wood the per capita consumption could easily be reduced from the present figure of 260 cubic feet to 150 or even 100 cubic feet without hardship. We use only 50 per cent of the total volume of the tree and leave 50 per cent to be wasted.

Forest fires every year destroy, on an average, 12 billion board feet of timber. If the forests were protected there would be just this much more timber available. Protection from fire gives the forests a chance to grow.

The aim of forestry is to bring the forest up to its highest state of productiveness and keep it there. In the United States, where forestry is not practical except on Government and State lands, the estimated annual production, as stated before, is 12 cubic feet per acre. In Saxony, where forestry has been practiced for many years, the annual production is 93 cubic feet.

If our final forest area of 450,000,000 acres is made to yield an average of 50 cubic feet per acre, as it can by the practice of scientific methods, there will be enough wood for a per capita consumption of 150 cubic feet by 150,000,000 people.

THE SCIENTIFIC BASIS OF GEOGRAPHY.

The evolutionary theory, more than hinted at in Kant's "Physical Geography," has, since the writings of Charles Darwin, become the unifying principle in geography. The conception of the development of the plan of the earth from the first cooling of the surface of the planet throughout the long geological periods, the guiding power of environment on the circulation of water and of air, on the distribution of plants and animals, and finally on the movements of man, give to geography a philosophical dignity and a scientific completeness which it never previously possessed. The influence of environment on the organism may not be so potent as it was once believed to be, in the writings of Buckle, for instance, and certainly man, the ultimate term in the series, reacts upon and greatly modifies his environment; yet the fact that environment does influence all distributions is established beyond the possibility of a doubt.

ENCYCLOPAEDIA BRITANNICA.

THE FIRST BRANCH BANKS

One of the provisions of the new banking law of the United States which is expected to have an important bearing on export trade is that which allows national banks, with the permission of the Federal Reserve Board, to establish branches abroad. Before the adoption of this act, it was impossible for national banks to extend their operations outside of the confines of the United States. The nearest approach of branch banks possible would have been the establishment of independent banks abroad with the backing and under the control of stockholders of the national banks.

The first national bank to signify its intention of taking advantage of the provisions of the new law is the National City Bank, of New York. On June 30th, the board of directors authorized application be made to the Federal Reserve Board, as soon as that body be organized, for permission to establish branches in Buenos Aires and Rio de Janeiro. A week later the bank dispatched two of its responsible employees to inaugurate the work in these two South American cities, so that the branches may be in operation as soon as possible after the necessary permission has been granted by the Government.

In announcing this new policy shortly after the decision had been reached, Frank A. Vanderlip, president of the National City Bank said: "I wish to emphasize that we intend to render service to the American business men in any direction which it is legitimate for a bank to go. We will have experienced and competent men in the field who will give information as to credits, trade conditions, what the people of this or that locality buy and where they are buying it now."

It is anticipated that this departure in American banking practice will be followed by the opening of branches and agencies in other cities, and it is almost certain that other national banks will follow in the footsteps of the National City. Once the new system is in working order it will be possible to finance American shipments without the much-discussed intermediation of European banks. It will be possible also for American banks to afford the exporters of the United States that same assistance in the development of their trade which banks of certain European countries have been rendering their exporters for many years.—[*Commercial America.*]

AN ANNOUNCEMENT

The JOURNAL wishes to announce that the editor, Professor R. H. Whitbeck has been granted a leave of absence from his work at the University of Wisconsin until February first, 1915. From October to February he will be with the Historical Division of the Carnagie Institution at Washington, D. C. During this time Professor Lawrence Martin, the Associate Editor, will have the editorial management of the magazine.

The JOURNAL of GEOGRAPHY

Volume XIII NOVEMBER 1914 Number 3

GEOGRAPHY AND THE WAR IN EUROPE

By G. B. Roorbach
University of Pennsylvania

TO read the war news from Europe without understanding the geographical features of the Central European countries leaves the story a jumbled and confusing mass of facts without order or meaning. Back of many of the movements of the various armies are the facts of physical geography. To trace the influence of these geographical factors on the war operations is a most illuminating and interesting exercise for a class in geography. For example, what light does geography throw upon the fact that French territory was so quickly invaded by the Germans and Paris itself threatened in the present war similarly as in the Franco-Prussian war of 1870? Why was not Germany invaded by the French and Berlin threatened? On the other hand, why should Germany find her eastern borders invaded by the Russians, in a manner similar to her own invasions of France? Why was the neutrality of Luxembourg and Belgium violated at the very opening of the war but not Holland's? These, and similar questions, are answered, in part at least, by geography.

Distance

One of the important geographical features in the war is distance. In the movement of large armies distance to be traveled is a great consideration. The further an army gets from its home headquarters, the greater becomes the problem of transportation of men, ammunition, artillery and food supplies. Long marches, with much fighting, exhausts men and horses and the efficiency of the fighting force becomes lessened. The further an army penetrates an enemy's country, the greater the danger of flank attacks and the cutting off of lines of communication, and consequently the need of superior numbers to keep the rear of the army protected. Long marches require much time and in modern warfare when striking quickly often means sure victory, time is a very important consideration.

In the war between France and Germany, Germany has the advantage of distance. From Metz, the strongly fortified city of Germany near the French frontier, the distance to Paris is only about 165 miles in a straight line, but from the French frontier to Berlin the shortest distance is approximately 400 miles. The shortest route from Berlin to Paris passes through Aix la

Chapelle, on the Belgian-German frontier, Liege in Belgium, and Maubeuge on the French-Belgium borders. From Aix la Chapelle to Paris is nearly 200 miles, not quite half the distance being across Belgium. From Maubeuge to Berlin, however, the distance is 435 miles. Hence it follows that German armies have considerably less than half the distance to go from their fortified frontier posts to the heart of France, as compared with the distance French troops must go to reach the heart of Germany. Paris is, therefore, simply from the fact of distance, much more subject to attack than Berlin and hence the strenuous effort made by Germany quickly to strike the French capital.

Between Germany and Russia the conditions are reversed. Where the German-Russian boundary line curves westward in Poland the distance from Russian territory to Berlin is 180 miles. Germany's territory comes nearest to Petrograd (St. Petersburg) where the boundary line curves far to the east in East Prussia, but here Petrograd is 420 miles away. Near Thorn on the Vistula River, the main railroad from Berlin to Warsaw and Moscow crosses the boundary 250 miles from Berlin but 780 miles from Moscow. Practically the same conditions exist in regard to Russia and Austria. Vienna is about 225 miles from the Russian frontier near Cracow, while Petrograd is nearly 800 miles from Austria. Judged by distance, therefore, Russia has much the advantage over Germany and Austria for invading the heart of the enemy's country.

Boundaries and Physical Features

The French-German boundary.—The character of the boundaries and the nature of the country along the frontiers determine, to a large degree, the routes taken by invading armies. The western boundary of Germany extends nearly north and south for about 450 miles, one third or 150 miles being with France. The northern half, bordering Holland, is entirely artificial, crossing a flat and open plain, densely settled and covered with a net work of roads, railways and canals. Along Belgium and Luxembourg, the boundary line crosses the dissected plateau of the Ardennes—a rough and wooded region sparsely inhabited. Encircling the northern and western edges of the Ardennes is the Meuse River, which, with its tributary the Sambre, leads from the German frontier across Belgium into France. South of the Ardennes the Moselle skirts the duchy of Luxembourg and offers a route into France. The boundary with France extends from the southern edge of the Ardennes near Longwy across the hilly, but low, plateau of Lorraine to the Vosges Mountains. The high, forested, granite slope of the Vosges continues the boundary southward, and is the most effective natural barrier between the two countries. Several passes cross the range, however, and at the southern end, between the Vosges and the Swiss Jura, a low, wide gateway opens—the Burgundian Gate. So low is this pass that a canal connecting the Rhine and the Rhone crosses it.

The nature of this boundary belt explains the German plan of invasion. A northern army, the Army of the Meuse, followed the route skirting the Ardennes barrier. This is not only the shortest route from Berlin to Paris, but the easiest as far as natural conditions are concerned, and, because of the fertile plain, capable of furnishing large supplies for an army. By leaving German territory near Aix la Chapelle and reaching the Meuse at Liege, Holland's neutrality could be observed, but Belgium must be crossed. Advancing up the Meuse and Sambre through Namur, Charleroi, Maubeuge, La Fere and Givet, low divides, crossed by canals, lead to the headwaters of the Oise and Aisne which continue in a direct line toward Paris.

The Moselle offers a second way of entering France. The army of the Moselle, following up the river to Luxembourg, in order to reach France by the shortest route, must cross Luxembourg territory to Longwy. Hence the invasion of this little country at the beginning of the war.

A third way of reaching France is across the Lorraine Plateau from the Rhine at Strassburg. The Army of the Rhine, following this route along the line of the Rhine-Marne Canal, reached France near Luneville and Nancy. Once through these frontier passes, by whichever route entered, the land becomes lower and more level and the French rivers lead in converging lines upon Paris. An invasion through the Burgundian Gateway is less advantageous. It is far from the heart of Germany, the narrow entrance is easily defended by the great French fortress of Belfort, and it leads, not into the heart of France, but down into the Rhone Valley.

The physical geography of this boundary belt offers much greater obstacles to an invasion of Germany by the French. In the first place, unless a route is followed across the low plains of Belgium and Holland into North Germany, French armies must leave low and open country for the increasingly more rugged and higher lands that lie west of the Rhine. Not only is the advance of an army into such a country difficult, but invaders can be easily repelled. The passes can be heavily guarded. In the second place, the great rivers of Germany lie across the path of invasion toward Berlin, rather than converging upon it. This is especially true of the deep valley of the Rhine, and beyond the Rhine lies the Ems, the Weser and the Elbe.

The Russian-German Boundary.—The Russian-German boundary is a great inverted S-shaped line 700 miles long, with no natural barrier throughout its length. The eastern extension of German territory between Poland and the Baltic exposes that portion to attack by the Russians from three sides, but the western "wedge of Poland points menacingly towards the German capital, and leaves the military strength of Russia free to choose upon what part of the long frontier it will direct the full force of its onset." (Partsch's *Central Europe* — Appleton, New York, p. 334). As the rivers of France converge upon Paris, so the rivers of eastern Germany—

the middle Vistula and Netze, the Warte, the Oder—point toward Berlin. The only natural barrier to the advance of Russian armies is the tangle of swamps and lakes in East Prussia. That the Russians should cross this long open frontier into Germany as soon as their armies had assembled is not surprising.

The same open frontier separates Russia from Austria, and here again Russian invasion of Austrian Galicia was easy of accomplishment. To cross the Carpathian barrier into central Austria-Hungary, however, would be a much more difficult task. But by taking and holding Galicia, Russia would open a possible line of advance for her armies from Poland up the valley of the Oder toward Berlin. To oppose this advance, Germany must depend upon the strength of her arms, unaided by natural factors.

A German invasion of Russia meets many difficulties. In addition to long distances, already mentioned, are the difficulties of poor roads formed by the deep soils of the plains; great stretches of swamp and lake; and the large area that would be necessary to conquer. As the Czar's armies advanced into Germany, they would constantly become more and more concentrated. They go from the large end of a funnel toward the small end. German invading armies must constantly spread out, from the small to the large end of the funnel.

Climate also offers protection to Russia. The long and severely cold winters are more effective than armies or fortifications, and the intensely hot days of summer would be very trying upon an invading army.

Sea Coast and Naval Warfare.—Germany does not need a navy to defend her sea-coast. Nature is her best defense. A low, flat, plain, slightly submerged, the German shore is bordered by very shallow waters, blocked with sand bars. All German seaports are situated far up the mouths of submerged rivers or at the ends of deep bays or "haffs," whose entrances are protected by bay-bars. No port is near enough to the open sea to be bombarded by warships; the narrow, crooked entrances to the rivers and bays are easily protected by land forts and sea-mines; the gently sloping shore line and barrier beaches would make the landing of a large army a slow and difficult task. Hence, the most that an enemy's fleet can do is to blockade the German coast and keep her fleet bottled up in her protected ha ens until such time as it will voluntarily come out. No matter how powerful the navy, it cannot harm the German coast nor force the German fleet to open waters. On the other hand, with the aid of the Kiel canal across the neck of the Danish peninsula and the enclosed bays, the German fleet can move along her own coast and concentrate in either the North Sea or Baltic at will. Any general naval battle that may occur between the English and the Germans will be the Germans' own choosing. As long as the English fleet is undefeated, however, Germany must remain cut off from the rest of the world by sea.

THE GERMAN CAMPAIGN IN FRANCE AND BELGIUM

By Lawrence Martin
University of Wisconsin

Changes in Political Geography

AT the end of the third month of the general European War in 1914 a number of features of interest to the geography teacher have been modified. Russia has changed the name of its capital from St. Petersburg to Petrograd, apparently adopting a Slavic rather than a Teutonic form of name because of race prejudice. France and Belgium are temporarily using as capitals the cities of Bordeaux and Havre, respectively, Brussels having been captured by the Germans on August 31st and Paris seriously threatened early in September. The capitol of Servia had been moved from Belgrade to Kragujevatz before the war broke out. Russia invaded the Austrian province of Galicia north of the Carpathians, capturing the strongly fortified city of Lemburg, surrounding Przemysl, and claiming Galicia as a province. Germany occupies Luxembourg and a large part of Belgium. The war on the sea and in the air was less important during the first three months than on land, although aeroplanes were used extensively in scouting. Zeppelin dirigibles dropped a few bombs in Antwerp and aeroplanes dropped bombs in Paris.

Topographic Influences

Interest is centered, however, on the German campaign in France. The geographical factors involved, admittedly with others, in the plan of campaign include the topography of the region between the Paris Basin and the delta of the Rhine. The intervening highland,* which we know (a) west of the broad rift valley of the middle Rhine as the *Vosges* and *Hardt,* (b) in western Germany as the *Rhine Highland,* with its four divisions of Hunsrück, Taunus, Westerwald, and Eifel, and (c) in Luxembourg, Belgium, and France as the *Ardennes,* decreases rapidly in elevation west of the River Meuse. The boundary between France and Belgium lies, not on the low divide in the highland of Artois but a short distance to the north. As is pointed out elsewhere in this magazine, Luxembourg and eastern Belgium are directly on the path from Berlin to Paris. The main German army, however, invaded Belgium near Aix-le-Chapelle or Aachen, crossed the River Meuse at and near Liege, passed through Brussels, and invaded France on

* Among the good descriptions, in English, of the physical geography of the area involved in this campaign are the articles by De Lapparent, Kirchhoff, du Fief, and others in Mill's *International Geography;* Partsch's *Central Europe;* Reclus' France, Germany, and Belgium in volumes II and III of *The Earth and Its Inhabitants;* Chisholm's Europe in Stanford's *Compendium of Geography and Travel:* and Davis's *Rhine Gorge and the Bosphorus* (Journal of Geography, Vol. XI, 1913, pp. 209-215) and *The Seine, the Meuse, and the Moselle* (National Geographic Magazine, Vol. VII, 1898, pp. 189-202, 228-238, and Geographical Essays, pp. 587-616). The latter even includes details concerning the origin of the surface features of some af the battlefields. See also *Paris sheet,* Nord M31, International Map of the World on the scale of 1:1,000,000.

the portion of its frontier west of the Ardennes. Here topography clearly played a part, for it was easier to cross the French frontier in Belgium than in the hilly Ardennes to the east. It seems possible that the development of the modern siege gun may have much to do with the control of routes of invasion by topography and by roads in the future. A sixteen-inch gun, such as the Germans are reported to be using, must be drawn by 30 to 40 horses or by a powerful traction engine. If the army using these guns is to advance with rapidity the route must not involve rough country or poor roads. West of the River Meuse and its tributary the Sambre, the German army found the favorable topography and good roads they desired. To the east in the Ardennes such rapid progress would have been impossible, as the three chief valleys were guarded by the French fortresses of Maubeuge, Givet, and Longwy, which the invaders did not wish to take time to capture, although each of them has subsequently fallen into the hands of the German armies, due to the secret development of remarkably large siege guns.

Fig. 1. Successive areas occupied by the German armies invading France. Lines drawn at intervals of a week. Modified from a map (Copyright, 1914) by the *New York Evening Post*. Line of battle Oct. 20th shown by a dashed line.

Invasion Moving Down Stream

The rapidity of the German invasion of France is unparalleled. As is shown in Fig. 1 the Germans passed Liege about August 8th. They occupied a small area in Belgium near Louvain and Namur on August 22nd. During the following week they spread out into northern France, so that August 29th saw them at Lille, Arras, St. Quentin, Laon, and near Verdun.

In a week this tremendous force moved southward about 85 miles, in the face of a stubborn, retreating force of allied French and English soldiers. The topography favored this advance through the valley of the Oise, but the loss of German soldiers was tremendous.

The advance through the Paris Basin during the following week, was no less remarkable. Figure 1 shows the German line on September 5th. It extends west to within 45 miles of the English Channel at Calais. It extends south beyond Epernay, Chalons, and nearly to Verdun. Moreover in the valleys of the Marne and Oise it reaches Meaux and Creil which are less than 30 miles from Paris. Meaux is within 23 miles of the walls of Paris, though there are strong forts between. The advance during this week is over 50 miles, as from Laon to Meaux. Topography is again favor-

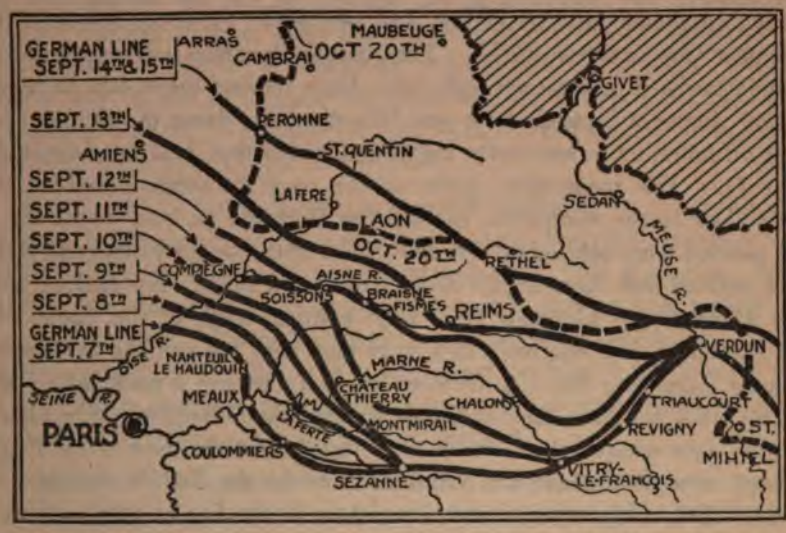

Fig. 2. Map showing successive positions of the allied French and British armies in driving the Germans back from Paris. Lines drawn for each day up to the time of the great battle north of the Aisne. Modified from a map in the *New York Sun*.

able, but the difficulty has increased with the distance from base of supplies, with the larger area occupied, and with the reinforcement of the French and English armies.

Retreat of Germans Across Hilly Country

The rapidity with which the Allies drove the Germans back is even more remarkable. Figure 2 shows the successive positions of the armies every day for the week September 7th to 14th. When the Germans turned away from their movement directly on Paris on September 3rd and went southeastward to try to break through the Allies' center, we see the be-

ginning of failure of the German campaign in France. The Allies' center held. Moreover the French and English rapidly drove back the Germans through the series of positions shown in Figure 2. This is all the more remarkable when we consider the topographic situation, although the German forces were weakened by (a) loss of men during the Allies' retreat and (b) diversion of troops to the Russian frontier. The topography favored the Germans. They were retreating northeastward. This part of the Paris Basin is a belted plain with ridges running north and south, the escarpments facing eastward and the cuestas sloping westward. The cuesta in the Champaign district near the Allies' center is crossed by the rivers Marne, Aisne, and many tributaries. The deeply-cut valleys of these rivers formed natural lines of defence for the retreating Germans. They were driven across the Marne; but they intrenched themselves north of the Aisne, whose narrow, gorge-like valley is 200 to 300 feet deep. Here the line held from September 15th to October 20th. The great battle which was waged for over a month resulted in little advances here, little retreats there, but no notable change. Between September 7th and 14th the Allies drove the Germans back about 60 miles, or to essentially the same position they held on August 29th (Fig. 1). The topographic grain of the country, better developed near Reims than to the northwest, enabled the Germans to hold essentially the same position from September 15th to October 20th, for the valleys and escarpments enabled each force to just about balance the other. No flanking movement dislodged the Germans from their position north of the Aisne. But with the aid of their enormous new siege guns they reduced the forts around Antwerp, occupying that city October 9th and Ostende a week later. Both of these cities had been used as temporary capitals of Belgium. On October 20th the right wing of the German army rested upon the coast of the English Channel between Ostende and Dunkirk faced by the French, Belgians, and British. This necessitates a break somewhere in the line of battle which extends continuously from the English Channel to Switzerland. Topographic conditions favor a change on the plain near the sea in Flanders rather than in the hilly region to the southeast in the Ardennes-Vosges.

A NEW DECLARATION OF INDEPENDENCE

THE United States Geological Survey has just published a most timely paper on Our Mineral Reserves (Bull. U. S. Geol. Survey No. 599, 1914, 48 pp.). This bulletin, compiled by the Director, George Otis Smith, shows how nearly complete is the independence of this country in regard to raw mineral materials. The list of necessary mineral products which we cannot provide consists only of the fertilizers, potash and the nitrates, and the metals, nickel, tin and platinum.

The author predicts a great development of our mineral resources, both because of the demands of the rest of the world for our products since their European markets are closed by war and also since the needs of our home markets will force the exploitation of many hither-to neglected deposits.

Dealing first with the subject of mineral fuels, it is shown that since the six countries which rank next to us in coal production are at war, the United States must inevitably find a large export trade waiting for its coal. This country possesses nearly twice as much coal as exists in all Europe, and shortage need not be feared. The great European market for our petroleum is closed, and no advance can be expected in this industry.

In regard to the mining and manufacture of our metals, conditions may be briefly summarized as follows: The importation of ores of iron, lead, zinc and radium will not be affected. Aluminum ores will decrease about ten per cent and those of platinum and manganese will be so scarce as to greatly hamper industries dependent on these metals. The supply, and therefore the cost, in our local markets of manufactures of iron, lead, zinc, copper and radium will not be reduced; in fact, with the exception of iron, our production of these metals must be curtailed.

There will be some shortage of arsenic and aluminum, a considerable deficiency in the supply of tin and antimony, but the most serious situation will be in the platinum and manganese markets. Our manganese deposits will be developed to meet this demand quite easily, but we have no important platinum resources. Probably enough for technical and mechanical purposes can be secured from Russia, if the supply is not diverted to the jewelry trade. Of our exports, iron and zinc should show a great increase, while copper and radium will have practically no foreign markets.

Of the miscellaneous minerals and their products, the only ones not found at least in part in this country are potash salts and diamonds. In spite of the careful and wide-spread search carried on by the Survey for a decade, there is still no known deposit of available potash in this country. The world's commercial supply of potash comes entirely from Germany, and is cut off by the war. We use potash in fertilizers, in the manufacture of glass, of soaps, certain bleaching chemicals, dyestuffs, some explosives, etc. Nitrates for chemical purposes are recovered from gas and coke plants and our phosphate reserves are the greatest in the world. The supplies of other mineral chemicals are adequate for all our needs, but we are decidedly delinquent in the use of our coal-tar and petroleum by-products.

In short, the United States is not only the world's greatest producer of mineral wealth, but possesses greater reserves of most of the essential minerals than any other nation. Probably no other nation in the world so nearly approaches absolute independence in respect to mineral resources.

R. S. KNAPPEN.

SIBERIA

By Leonard O. Packard
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THE region to which the name Siberia is now applied extends from the Ural Mountains on the west to the Pacific Ocean on the east. The boundary on the north is the Arctic Ocean; and on the south it is a line running from the source of the Ural River to the Tarbagatai Mountains, thence along the Chinese frontier as far as the southeast corner of Transbaikalia, and then along the rivers Argun, Amur, and Ussuri to the Korean border. Siberia may be considered as consisting of two parts, Western Siberia which includes the basins of the Ob and Irtysh Rivers, and Eastern Siberia, the remainder of the region.

As one traces these boundaries one cannot fail to be impressed by the vast area included within them, and at once begins to wonder to what extent this great area is adapted to human activities. At the present time the region does not exert a great influence outside its own limits. In the past it has played an important part in the history of both Europe and Asia. In early times its boundless plains offered unequalled opportunities for nomadic tribes to push their way from several eastern centers into western Russia, and indeed into all Europe, thus determining in no small measure the racial and cultural characteristics which are found in the invaded regions at the present time. The same levelness of surface made it easy at a later period for Russian explorers to forge their way rapidly eastward to the Pacific Ocean, where need of open harbors brought the Russian people into conflict with China and Japan.

But the service which Siberia is to render in the future will be quite different from that of the past. Instead of serving merely as a highway for the passage of wandering peoples the country promises to become one of the most important food producing areas of the world. Before Siberia can gain such a rating among the civilized and industrial nations of the world she must show resources commensurate in some measure at least with her great size; and these resources must be efficiently developed.

That Siberia possesses these resources, and that they are to some extent appreciated, is shown by the increase in population in recent years. The population of the region in 1910 was 8,219,020. Since 1897 the population of the Russian Empire has increased 31 per cent, the population of Siberia in the same time having increased 40 per cent. This increase in population is due chiefly to immigration from European Russia. The larger land holdings which it is possible for the immigrant to secure offer great inducement. In European Russia the average peasant can obtain only about five acres of land which serves to occupy his time for only a portion of the year. In Siberia the holdings are sufficiently large to require his attention for the whole of the

year and thus to yield him a better living. In western Siberia the population is widely scattered, while in eastern Siberia it is confined mainly to the chief roads and rivers.

The chief occupation of the people is agriculture, an industry dependent upon surface, soil, and climate.

As to surface Siberia presents considerable diversity. In the north and west the country consists mainly of a vast plain, while in the east and south plateaus and mountain ranges occur. In some parts of the western plain the surface is so nearly level that the water drains into the headwaters of one stream when the wind is in a certain direction, and flows into another stream when the wind is from the opposite quarter. This condition prevails near the source of the Lena and the Yenesei. Because of this exceedingly level surface of the western plain and resulting poor drainage, much of the land in this portion of Siberia is swampy and unfit for agriculture.

The western portion of the Siberian plain passes toward the East into rolling prairie land similar to that of the Canadian Northwest. Some of the prairie lands are exceedingly fertile, those of the Upper Yenesei equalling in fertility the Red River Valley. Other portions are rocky and so unfit for farming. Because of the rocky lands, the swamps, and the thousands of acres yet to be cleared of forests, millions of acres cannot be cultivated. Then, too, it must be remembered that a large part of the country is still unexplored. The parts best known lie not far from the main streams and the railroads. Large areas well adapted to agriculture are as yet unsettled simply because of lack of adequate transportation facilities.

The climate of Siberia compares favorably with that of Canada. Since the rain-bearing westerly winds are here far from their source of supply the rainfall is more or less precarious. According as the rainfall is much or little the crops are heavy or light, in some seasons being three times as heavy as in others.

As in Canada under similar conditions of soil and climate the chief crop is wheat, though rye and oats are also grown to a considerable extent.

Poppy culture for the production of opium and oil has increased in importance for several years. The climate of the Ussuri district is particularly favorable to the cultivation of this plant. This industry is entirely in the hands of the Chinese who rent the land of Russian land holders. The area under cultivation in the eastern coast region rose from 826 acres in 1910 to 9,450 acres in 1912. Recently a bill to prohibit opium-poppy growing has been introduced into the Russian Duma. The injurious effects of the industry is felt not only because of the use of opium, but because continued cultivation of the poppy exhausts the soil, thus rendering the raising of food crops unprofitable.

One might expect that on the vast plains of Siberia cattle raising would be a very important occupation. This is not the case however, as the Russian

farmer has apparently failed to meet modern conditions. He cannot compete with Australian meat products even in his home markets.

Although cattle are not raised in large numbers for meat products the country produces large quantities of milk and butter. Milk is an important article of diet throughout the country. An interesting adaptation to the extreme cold of winter is shown in the method of handling milk during that season. The milk is allowed to freeze in shallow pans. After a hole is cut in the center of each cake they are threaded on strings and thus carried to market or to customers. According to the Russion Year Book, butter constitutes Siberia's chief export. Because of its quality, which is constantly improving, it is now competing successfully with products of Europe and Australia. In 1913 the shipment of butter amounted to 173 million pounds. The butter is purchased at centers in Siberia and exported through foreign firms. The new American tariff which reduced the duty on butter from six cents to two and a half cents per pound opens a new market. A number of firms in Siberia are already supplying the American trade.

Another important product of the country is lumber. The industry of lumbering is confined, however, almost wholly to supplying local needs. Very little inroad has been made upon the forests in Eastern Siberia except along the Ussuri and its immediate neighborhood. No well organized lumber industry exists in the Far East, largely because of the restrictions imposed by the Russian Government to whom practically all of the forest lands belong. Another handicap is the difficulty of communication and transportation in these regions. The small amount of lumber exported is sent to Japan, China, Australia and some even to western Europe. As the industry becomes organized it is believed that the forest of the Amur River Basin will be an important factor in the world's timber supply. Doubtless pulp mills will be established, as much of the wood is suitable for making pulp. As has been suggested already much of the forest land of Eastern Siberia has not yet been explored. It is estimated that altogether Siberia possesses about 217 million acres of timberland. There is no other country which equals the Russian Empire in the extent of such lands.

As might be expected these vast forests are inhabited by many animals which are valuable for their furs. As the lumber industry increases, however, the fur industry decreases because of the reduction in the size of forest areas. Another reason for the decrease in the number of fur bearing animals is the lack of restrictions on hunting. Amazing numbers of pelts are sold at the fairs held annually throughout Russia. Nearly all Siberian furs are sold at the Irbit fair. According to consular reports for 1911 there were sold at this fair, besides other furs, four and one-half million squirrel skins, a half million rabbit skins, twelve thousand sable, two hundred thousand brown bear, sixteen thousand five hundred fox, one hundred eighty thousand weasel, and sixteen thousand five hundred gray wolf skins. The Russian government

has become alarmed at the rapid decrease in the number of sable and has passed a law prohibiting the killing of the animal or the buying, selling or exporting of sable furs for three years. The best sable skins sell for more than $200 each.

The only article of commercial value supplied by the cold tundras of the North is the ivory obtained from tusks of fossil Siberian mammoths. These fossil animals have furnished the Chinese with ivory for more than seven hundred years. At the present time from 500 to 650 hundredweight of mammoth tusks are found annually in the government of Yakoutsk. Small quantities are used by the inhabitants for carving, the remainder goes to Moscow and the European markets.

Siberia is also rich in minerals. The larger part of the gold and silver of Russia is obtained from this part of the Empire. All gold must pass through the government laboratories and thence to the mints of St. Petersburg. The chief gold producing regions are in Transbaikalia and in the vicinity of the Amur and Olekma rivers. The important silver deposits are found in the Altai region.

Coal is found in many places in Siberia. The coal deposits are large and promise much in the way of the future development of the country. At the present time, however, owing to the lack of transportation facilities, what little coal is mined is used only for home consumption. Mines are worked to a considerable extent near Vladivostok but there it is of poor quality. The most promising source of coal is Sakhalin where rich deposits exist. The great obstacle to the development of these deposits is the absence of good harbors on the western shore of the island where the coal is found in greatest abundance. In the towns and cities of Siberia wood is still used extensively for fuel but is becoming dearer each year, in many places being more expensive than in St. Petersburg. Hence the demand for coal is steadily increasing. With improved methods of production and increased transportation facilities the prices would be reduced and the consumption thereby increased.

Fishing is an important industry in certain parts of Siberia. About one-half of the trade in fish is in herring. The fisheries of the Amur River region are the most important of the Far East. This importance is due not only to the size of the industry but also to the fact that fish is the staple article of food of the native and Russian population. The salmon stands first and the sturgeon second in importance.

In addition to the river fisheries an abundance of fish occurs off the Pacific coast. From May to October all kinds of fish, including salmon, cod and herring abound in the waters around the peninsula of Kamchatka. It is said they are present in such quantities that after a severe storm the shores are covered with fish to a depth of five or six feet. Fish going up river are an impediment to vessels. The fishing industry off Kamchatka is largely controlled by the Japanese. The growth of the industry in eastern

Siberia in recent years is due to the aggressiveness of the Japanese, and also to the fact that, as many of the European fish stations have become exhausted, the unexploited waters of the Far East have attracted fishermen from the White, Black, and Caspian Seas. There has been little in the way of export in the past, but the transportation of frozen fish from this region to European Russia seems now to be firmly established.

The industries of Siberia are chiefly agriculture, lumbering, mining, and fishing. Manufacturing is not carried on to any considerable extent although the milling of flour is an industry of some importance. Blagoweshtchensk in the Amur Province ranks third among the milling towns in the Russion Empire. The milling of lumber, the brewing of beer, and the making of brick and cement constitute the other more important manufacturing industries. These articles are used almost entirely for home consumption. The one thing needed above all others to improve conditions in all branches of industry in the country is improved transportation facilities. The Trans-Siberian Railroad helps greatly in this direction, but it must be realized that this road can reach but a very small fraction of Siberia. The great problem is of course the long distance which both imports and exports must be shipped. Transportation within the country itself assists in the support of transportation lines less than one would expect for the reason that uniformity of surface, climate, etc., gives similar products and so little need for exchange.

In spite of all obstacles, however, progress is being made in the way of improved transportation. A branch of the Trans-Siberian Railroad is being constructed along the north bank of the Amur River. This road will be extended to Nikolaiefsk on the Pacific coast, thus providing a railway across Asia lying entirely in Russian territory. In addition to extension of railways, plans are being considered whereby it may be possible to convey products by canals, lakes, and rivers entirely across the Russian Empire from the Pacific coast to St. Petersburg.

A country so greatly handicapped in all her other industries as is Siberia could hardly be expected to carry on an extensive foreign trade. Her chief exports are grains and dairy products. Some lumber, fish, and oil seeds are also sent to other countries. Imports consist in large measure of manufactured articles of many kinds. America sends large quantities of agricultural machinery, sewing machines, and articles used in railway construction.

On the whole, Siberia's resources are large; consequently her future possibilities are great. A most important need is wise and sympathetic governmental control. Thus, greater enlightenment on the part of the inhabitants themselves, aided by foreign capital and enterprise, will give to Siberia her full measure of prosperity.

CONSTRUCTION MATERIAL OF CITIES

By Frederick Homburg, Cincinnati, Ohio.

OF all cities, ancient or modern, none has been as thoroughly studied as ancient Rome. The archaeologist has extended and supplemented the work of the historian, and has given us valuable information regarding Roman structures and monuments. We are now able to state of what the buildings, the walls and the streets of Rome were composed; and we cannot but marvel at the extent to which the neighborhood of Rome facilitated the building of the Eternal City. History might have been written otherwise had the strata of Rome been different; certainly Roman geology gave Roman genius an opportunity. There was clay for the making of brick and tile, and plenty of sand and material for lime, so that substantial buildings of brick and mortar could be erected. Nearby was also found a volcanic ash called pozzuolana, from which hydraulic cement was made. Good building stone was plentiful; for example a volcanic tuff known as peperino, also called Alban stone; and travertine, a porous light yellow calc-sinter. Travertine is an excellent building stone inasmuch as it is easily worked when just quarried, and as it hardens on exposure. We find it used in such buildings as the Coliseum of ancient days, St. Peter's of medieval times, and the modern Palace of Justice. In the days of the empire, when the provinces had to bear the burden of beautifying the chief city, the Romans became fastidious and called for expensive marble and other valuable rock not found in the vicinity; and in those days, freight boats, laden with building material from afar, helped with craft carrying other merchandise to almost choke the port of Ostia.

In the days of the republic, and as late as the early empire, Rome with its narrow winding streets and irregular construction was not particularly beautiful, but under Nero a new Rome sprang phoenix-like from the ashes of the old, and after that every Roman had reason to be proud of the appearance of his native place. The building mania of the imperators infected private men of means, and each tried to outdo his predecessor. Even later writers could say that there was nothing grander under the sun than the city of Rome, that no eye could compass its magnitude, no mind its beauty, no mouth its praise. In the third century an Arabian eulogist of Rome compared the state of those that had not viewed the great city with that of the blind who do not know the sun; and one of the later Christians from Africa at first sight of the Eternal City cried out: "How beautiful must be the heavenly Jerusalem, if this earthly Rome shines with such magnificence." Such was its extent that there was a saying: "In whatever part you happen to be, you are still in the midst." Looking down from the capitol on the vast expanse of houses, the great numbers of temples, palaces, colonnades, plazas with public buildings, theaters and baths, alternating with the fresh verdure of parks and gardens, the sight must have been indescribable. When in the year 357 the emperor

Constantius for the first time beheld Rome, he was speechless with wonder and admiration; he was dazzled by the crowding together of so much that was beautiful, and at each new sight it seemed to him that that must be the greatest and grandest of all. And where is all this beauty? An organism from which life has departed is decomposed and the parts are utilized in other combinations; and this has been the fate of the dead cities of antiquity. So stupendous were the ruins of old Rome, that they became veritable stone quarries for later generations; and costly material was torn from its place to be incorporated in the walls of some humble structure. Just as Memphis, the capital of ancient Egypt had to furnish the material for building Cairo, so the Coliseum, the palaces and baths of the Caesars were exploited by medieval Rome; and medieval ignorance and bigotry worked faster than time to destroy or inflict deplorable damage on the proofs of the civilization of the past. Religious fanaticisms of the early Moslems and Christians must have had something to do with this vandalism, and irreplaceable marbles, monuments of surpassing beauty were dumped into the kiln to be turned into lime.

The imposing ruins of the great cities of antiquity may lead to the mistaken notion that they were always and uniformly built of enduring substance. Whenever wood is available,—and it usually was in new settlements, ancient or modern,—it will be used because of its low cost, abundant supply, cheapness of transport, rapidity and ease of construction. Ancient cities like modern ones grew only gradually to be composed of stone; hence if old sites could later on be ruthlessly treated as artificial quarries, it is because they represent the final stages of old cities, and whatever was perishable had passed away. The celebrated colonnades of Greek temples, composed of the far-famed Doric, Ionic and Corinthian pillars, are believed to have been evolved from the tree-trunks that supported the tops of the early temples of wood. Past the middle of the first century, Rome was still largely constructed of wood; and that accounts for the awful catastrophe of the year 64. An inconsiderable blaze at the south-east corner of the circus spread to the neighboring booths, a high wind fanned the flames and drove them into the narrow quarters between the Palatine and the Capitoline, then up the hills and down into the vales beyond, so that when night fell, the red sky announced to dwellers afar off the destruction of the mistress of the world. Six days and nights the devouring element raged, and when the panic-stricken people thought it was quelled, it rose again and left fully two-thirds of the city a smouldering heap. With Rome as ruler of the world, the great fire proved a blessing in disguise; there was, indeed, much immediate suffering, but the enormous cost of rebuilding was laid upon the provinces, and Greece and Asia had to sacrifice their treasures of art to adorn the metropolis on the Tiber. A far-seeing plan of reconstruction was adopted: the streets were made wider, plazas were established, the number of fountains was increased, building material was prescribed to prevent recurrence of disaster, and by example, by prizes and by

subsidies a building craze was nurtured that gave Rome a title to the praises so lavishly bestowed.

For great conflagrations there is a cause and a condition: the drought and high winds of 1871 would not have turned the burning of a shack into the great Chicago fire, had not Chicago had so many wood buildings, wood side-walks and even wood-paved streets. Just as the emperors could say they found Rome a city of brick and wood and left it a city of marble, so the Chicagoans could boast that the fire found Chicago a city of wood and left it one of stone.

In Russia wood is the chief structural material. Now the initial cost of wood buildings is lower than more lasting ones; but when one considers the fact that Russian and Siberian towns in consequence of decay and fire are rebuilt every 20 or 30 years, it seems very doubtful that wood is cheapest in the long run. In 1812, the great fire of Moscow, started by patriotic Russians to compel Napoleon to retire, would not have consumed four-fifths of the city, had not the houses with but few exceptions been built of wood.

In both America and Australia the tendency of pioneer days to use wood still exists in spite of the greatly increased price. Wood is so convenient; all parts of a house may be prepared and numbered at the mill; a mere beginner can put up a frame house. In 1849 when adventurers from all lands flocked to the California gold fields, San Francisco quickly grew to be a city composed of factory-made frame houses; and as a result, in 1850, it was wiped out by fire three times in quick succession.

Were it not for the danger from fire, much might be said in favor of wood construction. Contrast the home-like appearance of a wood-built town, with the dreary aspect, the stifling monotony of mining towns built of corrugated sheet iron, such as are found in various parts of the United States and South Africa. It has been the fashion in our country to build at resorts monster hotels, all of wood, and very pretentious in appearance. Such a hotel was the "Inside Inn" an enormous wood structure erected on the World's Fair Grounds at St. Louis at the time of the Louisiana Purchase Exposition. It was conveniently and practically built; there were 4,000 rooms, 6,000 beds and plenty of fire-escapes; all passed off well, yet what terrible chances the thousands of guests took, that came and went each day. Prevention is better than cure. It has been calculated that the first cost of a fire-proof building is about 15 per cent higher than that of the dangerous kind, and that the durability and the reduction in repair and in insurance premiums,—if such should be deemed necessary,—would wipe out this difference in a few years.

Incombustible material is, however, not necessarily safe. Of course stone will not burn; but the various forms of calcium carbonate, such as limestone, travertine, marble, etc., are decomposed when strongly heated, are turned into lime, and crumble. Ordinary mortar, too, is, after exposure

composed in part of calcium carbonate; hence the danger of collapse of brick walls during or after a fire. More resistant stone, such as granite and sandstone, when strongly heated in a conflagration and then struck by water will crack; this in fact, was the method of getting through stubborn rock masses in the days before blasting agents were employed. Steel is a very modern building material; we see such framework of tall structures in our large cities, standing out like metal skeletons against the sky. Now while steel or iron will not burn in air nor be easily melted, such buildings cannot be pronounced safe unless the surroundings are; strong heat will cause expansion and pushing out, still stronger heat will weaken the carrying power of the girders and cause bending and with its enormous load a structure cannot stand the strain.

It is evident that our safety depends on the safety of our neighbors. It has been suggested that buildings be labelled safe or dangerous and that the latter be taxed more heavily; this, it is claimed, would not be unjust in view of the fact that, as a public danger, such structures add greatly to the city's expenditure. If all buildings were safe there would be no chance for conflagrations. The term "safe" and "fire-proof" are not synonymous; the first may be relative. Material to be fire-proof must not only be incombustible but must remain practically unchanged by fire. One good effect of the rise in price of wood is that it is increasingly turning attention to Portland cement construction. Portland cement is made by grinding and mixing and heating the materials (which are essentially limestone and clay or marl) and then powdering the resulting mass. The resulting yellowish green powder, when moistened, hardens in air or under water without change of volume, and becomes stone-like. It is not usually applied by itself, but in erecting buildings of what is commonly called ferro-concrete. You see board columns with twisted steel rods in the midst. Into these boxes and around the rods is filled the concrete, made by mixing and moistening crushed rock or pebbles and cement. On Sunday morning, Feb. 7, 1904, fire broke out in Baltimore which raged for thirty hours and was stopped in consequence of a fortunate shifting of the wind. Just after Apr. 18, 1906 the whole country was shocked by the news that San Francisco was ruined by an earthquake and that the ruins were in flames. A valuable lesson was drawn from these terrible disasters; experts examined the affected districts in both cities, and their conclusion was that the concrete structures were not only most fire-proof but also most resistant to earthquake shocks.

BUILDING MATERIAL IN THE UNITED STATES

Between 1890 and 1912 the amount of Portland cement produced in the United States increased from 350,000 to 83,350,000 barrels. In 1909 wood was used in only 27.5 per cent of building materials in 128 of our leading cities. Brick buildings made up 61.49 per cent of the total construction by cost. Wood is still much used in small town and country construction. [From Salisbury, Barrows, and Tower's *Elements of Geography*.].

THE PURPOSES OF GEOGRAPHY TEACHING

By Richard Elwood Dodge
Teachers College, Columbia University, New York City

IN these days when it is becoming increasingly possible, by simple tests, to measure progress in teaching, the question naturally arises as to the ways in which progress can be measured in such a time-honored subject as geography. This is a pertinent and a perplexing subject,—pertinent because efficiency should be a test applied to all school subjects, and perplexing because geography, from its nature, does not permit the application of efficiency tests as readily as subjects like arithmetic, spelling, drawing, etc., that can be readily divided into a number of sub-units in each of which certain definite standards can be set.

We cannot measure progress unless we know where we are going—the goal which we must reach in the end. There is no general agreement as yet as to the objects of school geography study, either from the standpoint of knowledge, or the ability of the learners to use their knowledge in the seeking of more knowledge, or in the interpretation of every day affairs.

The first stage, therefore, in any serious effort to measure geography work in schools is to agree on certain general standards as to the aim of the work. Then we can shape our course toward the goal in order that our progress each year or day may be measured in the proper perspective of the problem as a whole.

When we can divide our course, not into certain years of work, but into certain definite steps, each of which ought to develop certain abilities and powers, then we can apply tests that will measure progress in each sub-unit.

A teacher knowing the ends of her work and the powers her pupils should display at the beginning and the end of the year, can really do something, and not be merely helping turn the endless treadmill of daily monotony, which has characterized school geography so much in the past.

The first step, therefore, is to agree on certain desirable ends to be attained, and then to question oneself as to how much each year's work is contributing toward the attainment of those ends. The methods employed must of course be reviewed in any such seeking after ideals. The too common practices of question and answer, of memory work and recitation, reveal themselves at once as incomplete methods of work. Training in how to study and use geography is more vital than a knowledge of the facts of geography.

Is it worth while to memorize the capes and peninsulas, to drill on the location of mountains and inconsequential rivers, or is it more worth while to teach the significance of these features in the human life of a locality, and to permit the location knowledge to come out chiefly through this larger study?

Is it worth while to hear recitations from a closed text book, or is it more worth while to have the maps and text before the pupils and to show them how to get the permanent things out of their study?

Is it worth while to illustrate the common features of the earth from some distant land, or is it more worth while to make the home locally significant as a geographic area that is replete with geographic relationship?

Is it worth while to make pupils think that geography is a perfect subject and the text book the last word on the subject, or is it more worth while to show them that geography is a vital, growing subject and that its problems will be of significance all their lives?

Is it worth while to require every pupil to repeat a certain phraseology, sentence by sentence, or is it more worth while to have him tell a story and illustrate it by his own most natural means of expression?

Is it worth while to test pupils' knowledge of fact by making them draw a map from memory, thereby impressing upon their minds error, or is it more worth while to give them a good base map and ask them to express their knowledge on that?

These are only a few of the problems that geography teaching brings up; some of them dealing with methods of daily practice, others, and the more fundamental, involving a consideration of the whole problem of geography teaching.

Until we can agree on the ends most worth while, and the best means of reaching those ends, it is unfair to measure a teacher's or pupil's progress by personal standards or ideals. A superintendent or critic who takes a teacher to task for not pronouncing Missouri or Himalaya according to his personal and often inaccurate standards, and yet who will praise a clock work recitation, with questions and answers ticked off in perfect time, has much yet to learn as to the real end and purpose of geography teaching, and is not using the correct tests.

We all desire improvement in geography teaching; we have vague images of ideals which we would like to reach. Can we not agree on these desirable ideals, and then work on the means that should be employed to reach these ends, with the least waste of energy? Then we will be in a position to test by proper standards our work of the day and year. At present the tests we apply have no standard values. They fluctuate with the occasion much as does the value of a Mexican dollar in the banks of the world.

GEOGRAPHY IN NORMAL AND SECONDARY SCHOOLS

The Teachers College Record of Columbia University has recently published the following papers, the first four by Richard Elwood Dodge and the last by Clara Barbara Kirchway (Vol. XV, No. 2, March, 1914, 68 pages).

The Study of Geography in Normal Schools.

Tendencies in Secondary School Geography.

A Half Year Course in the Elements of Physical Geography and Its Applications.

Regional Geography in Secondary Schools.

Economic Geography of the United States.

PICTURE STUDY IN GEOGRAPHY

By Lucy M. Gardner

ALL teachers know the value of picture study in language but many do not realize to what extent pictures can be used in geography. By picture study in geography I do not mean the passing around or holding up of pictures in class or the putting them up on the wall for inspection. I mean thorough and thoughtful study which will not only stimulate interest in geography but arouse it in history and all branches of art, thus laying a foundation for a broader appreciation of these subjects in later years.

This work can be made just as effective in the upper as in the lower grades. Teachers of physical geography know that so far as possible every phase of it should be studied first hand. But there are many features that no one locality will illustrate and some, such as glaciers and volcanoes, that can seldom be studied by means of class field trips. The teachers, therefore, must use pictures extensively or many phases of the subject will be dry and meaningless. As long as pictures are going to supplant first hand study they should be given careful consideration by each member of the class.

There are many means for securing this. In case a class has been working for a time on rivers, when the subject has been completed, the teacher may cover a screen with numbered pictures representing such subjects as flood plains, falls, rapids, cascades, water gaps, streams littered with boulders, chasms, meandering streams, deltas and so forth. Then the class may be given a set of questions after the following manner:

What name is given to a stream like the one shown in 57?

What picture shows a young valley?

What picture shows a cut off?

Under what circumstances might the boulders shown in 28 be moved?

What one shows a water gap?

Which one illustrates cascades?

Which one shows a braided stream?

The class may be given a few days for preparing the answers and then a class period may be taken for discussing them. If a pupil gives an incorrect answer, the teacher should hand him the picture and question him until he corrects his error. In order that the pictures may be handled quickly they should be piled on the desk according to a given order, number one being on top.

Class tests by means of post cards may be given. In this exercise members of the class are given post cards showing various physical features and having on their front questions concerning the features. For instance, a card may show a valley glacier, and such questions as these may be asked:

What kind of a glacier is shown here?

What are the other types of glaciers?

In what countries are glaciers found?

Each pupil may be given a paper on which he writes the name of his picture and answers in statement form the questions concerning it. If a school has a lantern, the exercise may be managed in the following manner: the pupils may be given cards as in the exercise described above and may be asked to take down on paper the name of the feature shown and the questions concerning it. The next day the pictures may be thrown on the screen and each pupil asked to state and answer the questions concerning his picture.

Some teachers are fortunate enough to have large pictures which are furnished by the school. If such is the case, an exercise may be given in which a pupil may stand up before the class and holding his picture up so that all may see it well, point out and describe the prominent features shown there. Sometimes the plan may be varied by letting the pupil merely point to the features and then call on different members of the class to answer whatever question he chooses to ask concerning them. Still another exercise is to put up a picture and let the whole class write out what they consider a good list of questions concerning it. A few minutes may be taken for having them read and discussed.

Another exercise which pupils like, but which is adapted only for small classes is this: numbered pictures, each representing some very conspicuous feature such as a meandering stream, crevasse, moraine, artesian well, snow field, drumlin, tornado cloud, waterspout and the like, may be placed about the room. Before starting the exercise, the class may be given papers and asked to number them as for a spelling lesson. Then they may pass to the pictures and write opposite the proper number on their paper the name of the feature shown in each picture.

Pictures should figure conspicuously in the geography work of the lower grades. If a class has been studying lakes, every pupil in it may be given a picture. The pictures should show rowing, canoeing and fishing scenes, and freight and passenger steamers. After studying the picture a minute or two, each pupil may describe his. After all have had a turn, they may draw conclusions concerning the uses of lakes. This exercise may be used as early as the third grade.

A lesson on the different industries and some allied products may be worked out admirably in a similar manner. All teachers know that children often confuse products and industries. If an industry in a certain locality is called for, a child will give fruit when he should give fruit raising. Drills on the differences between products and industries may be given by means of cards or other pictures. The subjects shown in them may reveal a list after this order: a cluster of oranges, people picking fruit, a cotton boll, people at work in a cotton field, men working in the woods, piles of ore and so on. Each pupil may then tell whether his picture represents simply a product or an industry. If he says the former, the teacher may ask of what industry it is a product. Classes look upon such an exercise as a game, but teachers know from experience that a great deal is unconsciously learned.

After studying the climate and surface of any given region a class may be allowed to work out the industries from pictures. Before the teacher gets ready for the industrial lesson she should put up industrial pictures representing the locality under discussion. At odd minutes the children may list the industries and subdivide them. If they are easily confused on the distinction between industries and products, it is well to have a separate list of products made.

Pictures are invaluable in studying scenic resorts, for children have traveled little and can form no idea of natural scenery save through the medium of pictures. The late spring is the time when plans are laid for vacation trips. This season, therefore, is an excellent one for studying scenic resorts with classes and at the same time for working in a review. The plan will succeed only in the upper grades and in schools equipped with a lantern. Several weeks before the close of school the teacher may talk a bit with her pupils about vacation trips, asking where they would like to go if they could go anywhere they chose. After interest is aroused, she may suggest that each pupil in the class carefully plan a trip and present his plans, when finished, to the class by means of an illustrated talk.

The first step toward preparing such a lesson is for each pupil to hand to the teacher a slip of paper on which he has stated in brief form what he purposes to do. If several pupils select the same trip, some of them should be asked to choose others or, if possible, one may plan the main trip while others may work on side trips. For instance, some pupil may wish to go from Chicago to Los Angeles via the Sante Fe Railroad while another may describe a side trip to the Grand Canyon. After the trips are agreed upon, the teacher should post a list of available books giving information on them. Each pupil should also be provided with pictures which may be obtained from magazines, railroad folders, old geographies, picture companies and post cards. In planning his talk, he should consult folders for his route, connections and time required for the trip. He should also ascertain the cost of this trip from his local agent. When a pupil is ready to give his talk, he should notify his teacher and together they should decide upon a class hour for the presentation of the material.

Before the work is presented the pupil or pupils should hand to the teacher a bibliography of references and an outline of the talk. The English teacher is often glad to coöperate in this part of the work. The pupil should also hand in a list of pictures he intends to use. A responsible pupil may take charge of this list, and when the pictures are returned, check up the list. This arrangement will prevent the loss of pictures and will save the teacher trouble.

When the lesson is given, a map should first be thrown upon the screen. Then the pupil may point out on it the route he intends to take, the important cities he will pass through, and the roads over which he will travel. After this step, pictures of points of interest in the cities he intends to visit and of

natural scenery, may be shown and discussed. Sometimes causes for such phenomena as Yellowstone Park, Crater Lake, Natural Bridge, Niagara Falls and the Grand Canyon may be explained. After the main route has been described, the side trips may be taken up by the same pupil or other pupils.

At the close of a talk the class should feel free to criticise the discussion as to clearness, vividness and interest or the lack of these qualities. This friendly criticism will lead to improvement in later talks.

I know from experience that classes enjoy lessons of the above nature; and the work of preparing them calls for individual effort and acquaints the pupil with books of travel, while the presentation of them trains a class in talking before an audience, helps to fix locations and inspires all with a desire to travel.

Even though a detailed study of pictures is not desired, any pictures that are used by a teacher should be made the subject of some study. When those in magazines or books are used, the book should be placed on the teacher's desk and questions or comments on the pictures should either be retained on the board or on a slip of paper kept with the book.

When pictures are placed on the wall or in the blackboard tray it is well to leave them there for several days so that the scenes or objects may become fixed in the child's mind. They may often be advantageously used a second time. Naturally in studying such cities as Milan and Venice the teacher shows pictures of the cathedrals, and the pupil soon associates cathedrals with the names of these cities; but he does not gain the broad impression that beautiful churches are found all through Europe. The teacher may succeed in giving this impression if, after studying many cities such as Cologne, London, Paris, Venice, Milan, Constantinople, and Rome, she displays all together pictures of cathedrals found in these various cities.

In order that the child may do something more than merely look at pictures on the wall, slips on which points of interest concerning the pictures are written, should be pinned under them. If one has a series of pictures illustrating a given industry, they should be arranged according to the consecutive steps taken in it. The pupil should be directed to look at them in this order. In this way, he gets a clear image of the industry in as far as pictures can give one.

Although this may be a slight digression from the subject, I should like to suggest a convenient method for putting up pictures for study. A pupil can get no value from them unless he can inspect them closely. If they are put on a wall space, the upper ones are always too high for a child to see them well. If pictures from magazines are used, they are too limp to stand in a blackboard tray. Both of these difficulties may be overcome by arranging the pictures thus: With one or two patent clasps they may be fastened to white bristol board sheets which are all the same size and large enough for a

good sized picture. These can be stood up in a tray and are within reach of the smallest child. Furthermore they can be handled without any detriment to the picture. Pupils may aid the teacher in taking off the clasps or putting them on and in piling up the board and pictures.

Pictures mounted in this way are far more easily taken care of than permanently mounted ones which are bulky and hard to pack, because they vary so much in size. They also admit of a more systematic arrangement than permanently mounted ones. They may be kept filed in large envelopes, which may be obtained from a photograph gallery. If the nature of the contents is indicated on the outside, a set of pictures for a lesson may be gathered quickly. For instance, if a teacher is working on the Rockies she may go to the envelope labeled Western Mountains. If she wants material on lumbering, she can go to the one labeled American Industries. Of course every teacher will have her own means for filing. Postal cards may be arranged in packets according to contents and fastened with a rubber band.

The plans for picture study which I have outlined, may sound as though a large number of pictures were needed. Naturally every teacher knows that the more pictures a teacher has, the better equipped she is, but no teacher need be discouraged if, at the start, she has only a few pictures. These studied by pupils will prove of more value than many looked at heedlessly. If a teacher asks her friends to send her post cards showing geographical subjects instead of the ones often sent, and if she is on the alert for pictures in magazines and papers and secures illustrated railroad folders which she sees advertised, she will soon accumulate a valuable collection.

PRIMARY GEOGRAPHY AND READING

By Philip Emerson
Cobbet School, Lynn, Mass.

ONE of the best opportunities for practical geography teaching open to all primary teachers is afforded by the frequent lessons of a geographical nature found in nearly every series of school readers. It is theoretically true that primary geography should be based very largely on good study of local geography, with many field lessons. In practice, classes are too large and teachers poorly prepared to do this. But schools and teachers have from time immemorial studied books effectively: they are planned for just this. And the most essential features of any primary curriculum is reading. It occupies the most time on the daily program. Whatever opportunity it offers for the study of geography should be appreciated and full advantage taken thereof.

To make the stories of child life in various lands geographically effective the causal reasons for customs should be noted in simple form and the comparison of each new field of life with those traversed in previous lessons

should call attention to contrasts in customs between different climes and likeness in ways of living where conditions are similar, so that a sense of the larger principles of geography as to the effect of environment on life may be established, a basis for the later formal statement of such principles. This end will be inevitably secured under a teacher who understands modern geography herself, and the fundamental truths of life relations are so simple that any teacher who wishes may easily take sufficient thought to do efficient service to this end. Thought will naturally turn to the ways of home life and their explanation also as contrasts with life described in the readers awakens thought.

A lesson in reading commences with a preparatory talk whereby the teacher guides the class to gain a basis for appreciating the content of the selection as well as new words that are introduced. Any series of readers will contain stories of Eskimo life, clearly chosen because of a sense of the geographical values of the strong controls exercised on life by Arctic conditions and the appeal their novelty makes upon the children. Pictures in the book supplemented by others chosen by the teacher may present typical scenes showing the winter snow and ice, the lack of trees or bushes even when snows have melted in summer. The question as to how people can live there will bring up the thought of houses and clothing and fire, for warmth and food. It is not necessary or possible that the little folks should think out fairly and correctly many of the results of climate and consequent resources on the location and manner of human life in the Arctic. Erroneous conclusions may be recorded for the time being. Then turn to the text to find whether life there is what the children think it must be. After reading, compare fact and conjecture, and it will be clear usually where the children went astray in their thought. The result will be preparation for the reading lessons that insures interest and a true basis for geographical study continued with textbooks in later years.

With Arctic life the lessons will cover somewhat this range. The snow igloo of winter, using the material at hand and meeting the severest cold quickly; the skin tent of summer upon a bone framework, again using the materials available in the absence of woodlands. The homes along the ocean shores in winter, since the long cold drives away all life except that which, like the polar bear and Eskimo, can prey upon the seal and other sea animals. The wandering life of summer, following the wild reindeer, beside the streams where fish are abundant, or where berries and birds give variety to food. Clothing made from skins of mammals and birds, with bone needles and sinew thread, warm and soft with fur and feathers. Fire for warmth and cooking, from seal oil, carefully treasured and sparingly used. Life in general one hard struggle for food and life. The story might cover more relations and conclusions; a single lesson or group of lessons will not traverse all this suggested survey; but in part or whole it will lead the children to feel the values

of geographical conditions in affecting life and will put them in that attitude toward geographical reading lessons that means a thoughtful and more abiding interest.

In similar wise the available readers used in the first three years of most school systems will cover the life of tropical deserts, the Arab; tropical forests, the negro; the primitive life of temperate plains or forests, the Indian. They will also present a range of civilized life as it develops in a mountain land, Switzerland; on a river delta, Holland; with a strange race and history, Japan or China. With each new group of lessons the field covered in previous geographical reading lessons will of course be reviewed. When general truths are given statement in later text or teaching they will come most naturally; principles will not be mere words for use in examinations, they will be understood and used in general reading and life.

Other lessons in reading books deal with the various occupations and with the foods and fibers of most importance. Such lessons deserve similar treatment. The study of specimens from homes and stores, and the use of pictures each class may gather for itself with the teacher's help, will give needed material aid to full understanding of and interest in the stories. Each occupation may well be considered with relation to each of the various races already studied; each product, to consider how its introduction by commerce to Eskimos, negroes or other primitive peoples might affect its way of life. In conclusion, then, our primary reading books offer a wide range of lessons in human life and its environment, as presented by various typical peoples, by occupations and by commercial products. If these are not merely read but are used as occasions for thought, the reading itself will be more profitable and a sound foundation will be laid for more of real geography when maps and textbooks replace readers as a basis for the work.

METHODS OF TRANSPORTATION IN FUKIEN PROVINCE, CHINA

By Ling Hau Deng
Foochoo, China

"THE isolation of the Chinese has prevented them from joining in the great industrial revolution which is going on in western lands." Therefore their methods of transportation have been undergoing a similar slow development until the past few years. In fact, all methods of transportation in China "are primitive according to western ideas, and all are very slow and tedius." Because of great differences of climate, relief, and topography, there are many differences in the means of transportation. The southeastern provinces of China, being hilly, and temperate in climate, have a great diversity in methods of transportation, compared to those of the northwestern Chinese provinces. Let me consider especially Fukien province in some detail.

Fukien is occupied in the northwest by the Wu-I Mountains. The Min River, having its source in the northwestern part of the province, flows to the south and east, and, with its branches, serves as a good means of transportation throughout the year, never being frozen as are the rivers of northern China. The Giu-Lung River and several smaller streams serve in the same way in the southern part of Fukien. Besides these, there are canals in which small boats sail, a short railway, the backs of men, and beasts of burden, all of which serve as means of transportation.

Transportation by coolie-porter is the simplest form and the hardest labor. In the interior, away from the river, things are always carried by coolie-porters. Even in the larger towns and cities there are always many men, women, or boys, carrying heavy things through the streets, carrying their loads on their backs or on bamboo sticks. Passengers are carried in chairs. Large articles, suspended from a pole, are carried by two men; heavier things, such as iron or stone for building structures are carried by more than two men with two or three wooden poles. One can imagine how slowly such things are carried. Even though this requires such hard labor, the supply of coolie-porters and chair-coolies is still very great, because most of the people of Fukien are poor.

In a few places, passengers are also carried by horses, their speed being greater than that of the chair. Horses cost ten cents per mile while chairs cost six cents. Donkeys are occasionally used for carrying passengers; their cost and speed are about the same as those of horses.

In connection with coolie-porters, chairs, and horses, the roads should be described. They are generally bad. Radiating from the market towns are the main roads, which are made of stone, and are no more than twelve feet broad. They are not even smooth, and some of the stones are broken into small pieces. The branch roads are still worse. They are narrower and dirtier and some of them are made of clay, which becomes mud in rainy weather. Therefore neither carts nor bicycles are seen on these roads.

There are also canals in some places. For instance, heavy things such as timbers are transported by boat on a canal from Nantai through the Water Gate of Foochow City. This canal has not been improved for a long time, and so it is now just deep enough for small boats. The cost of transportation by this means is cheaper than by coolie-porters, if the things to be transported are enough to require a whole boat.

Along the banks of the Min and Giu-Lung rivers are masses of junks and small boats often densely packed together. When the wind blows in the right direction, these are propelled by sail; but if the wind does not blow in the right direction the junks as well as the small boats are propelled by oars. The junks carry heavy commodities, such as rice, salt, or timber, to sea-coast points; the smaller boats are used for passengers and inland freight. Besides these, for carrying passengers there are also, where the streams are navigable,

steamboats. They run about eight miles per hour, and cost five cents for about that distance.

Some things are transported merely by utilizing the waterways without other means of transportation; for instance, timber and bamboos are floated down the river in the form of rafts.

On the sea east of the province, steamers serve as means of transportation, to other parts of China, transporting passengers and freight. No other means of transportation found in Fukien are so convenient, safe, and fast as the steamers. Each passenger* pays seven and a half dollars from here to Shanghai, which requires a journey of thirty-six hours.

Beyond Amoy there is a railway, but—unfortunately—it is short. At first it was planned that a railway should be built from Sung-Su to Ciong-Ciu. But it failed of success with only eight miles in length constructed from Sung-Su to Geng-Dung-Gio. This was seven or eight years ago. If passengers wish to go from Amoy to Ciong-Ciu they buy a ticket for 35c from the railway company at Amoy; then they are carried by boat to Sung-Su where the railway commences; after arriving at Geng-Dung-Gio passengers are required to again take steamer, landing them at Ciong-Ciu. This is quite inconvenient for passengers, although the steamers are provided by the railway company. The railway trains run slowly and stop now and then in some places to wait for passengers, so that it takes three hours, on an average, to travel the length of the road.

The rivers should be dredged and engineering works should be undertaken to make the Foochow harbor a good one. Better roads and better steamers should be prepared, and a network of railways should be built. Then I dare say that the future of Fukien would be wonderfully prosperous.

CURRENT GEOGRAPHICAL NOTES

The Panama Canal Finished on Time

In the month of February, 1908, Colonel Goethals, the army engineer who had been placed in charge of building the Panama Canal, appeared before the Committee on Inter-oceanic Canals of the United States Senate and made the unequivocal statement that the canal could and would be finished within six years from July of that year. This period expired July 1, 1914, and the canal is finished. As a matter of fact it has been practically completed for nearly a year, except for certain auxiliary features. The date of the formal opening of the waterway for the commerce of the world remains at January 1, 1915, a date tentatively decided upon more than a year ago.

We have been told just what the opening of the Panama Canal is to mean to the commerce of the world so often that it fails to make an impres-

* All money values quoted are in Mexican value, which must be halved to give approximate value in United States currency.

sion on us any longer. Even the announcement made by a large steamship company the other day of a round-the-world tour through the Panama Canal for the early part of next year seemingly fails to arouse the imagination.

Why this apparent indifference to the actual accomplishment of an alteration in geography, to the coming true of the fancy of Balboa, and the fulfillment of the prophecy of Goethals? Is it because so much has been said and written that the subject is threadbare? Perhaps. But a better answer is that its ultimate completion, and on time, had been discounted six years ago by an abounding faith in the ability and energy of those to whom the work had been entrusted.—[*Commercial America.*]

Industries and Trade of the United States

The United States is sometimes called by German economists the land of unlimited possibilities, and when we consider the vast area, the rapidly increasing population and the enormous output of its mines, farms and factories, the truth of this statement is apparent.

The value of the products of the mines of the United States amounts to 2,000 million dollars, or 50 per cent more than the combined value of the mineral products of Great Britain and Germany. The value of the coal alone is greater than that of the output of all the gold mines of the world.

The value of the agricultural products of the United States has reached the sum of 9,000 million dollars, an amount greater than the combined value of the agricultural products of any other two nations. If all the grain fields of the United States were placed side by side there would be room enough inside of them for the whole of Germany and Great Britain. The cotton fields of the United States produce 60 per cent of the world's crop, and the value of the raw cotton exported in 1912—623 million dollars—is greater than that of any single product exported from any country.

In the value of the output of its manufacturing industries the United States has made more rapid strides than any other nation in the world. In 1850 the total value was 1,000 million dollars; in 1910 it was 21,000 million dollars, an amount more than double that of its nearest competitor—Great Britain—and greater than the value of the output of the manufacturing industries of Great Britain and Germany combined.

The growth of the foreign trade of the United States serves as an index of its marvellous economic expansion. Up to 1876, like most new countries, the United States imported more than it exported. Only three times prior to that date did the exports exceed the imports. Since that date there have been only three years in which the United States did not sell more than it bought.

In 1880, 55 per cent of the exports consisted of food-stuffs, while in 1912 only 19 per cent consisted of this class of products. The rapidly increasing population of the country employed in non-agricultural industries caused an increased consumption of products of the farm. In the mean-

time the factories of the country turned out more products than could be consumed at home. This surplus of manufactured products was sold abroad and more than made up the decrease in the percentage of the exports of foodstuffs. The future prosperity of the United States will depend upon our ability to export our surplus manufactured products, for if we do not do so hundreds of our mills and factories will be closed and millions of our workmen reduced to poverty and our American standard of living reduced to the European level.

In 1880 manufactured products represented only 15 per cent of the exports. In 1912 they amounted to 1,100 million dollars, or nearly 50 per cent, and today in certain classes of manufactured products we compete with Germany and other foreign countries.

So long as our exports consisted of raw cotton, foodstuffs and products of the fields and mines, there was no need of what is called industrial education, and now, as far as a large part of our manufactured products is concerned, industrial education would be of very little value, but there is a steadily increasing demand for more highly manufactured products which makes industrial education a necessity.

Although the United States is still behind Great Britain and Germany in the value of the exports of manufactured products, it is increasing the export of this class of goods at a much more rapid rate than either of them. An examination of the character of these products shows that 60 per cent is made up of partly manufactured products, or of such products as refined oil and copper, in which Great Britain and Germany do not compete. The remaining 40 per cent is made up of more highly manufactured products and, with the possible exception of machinery, mainly of such classes of articles as can be made in large quantities at a low rate.—[J. J. MacFarlane in *Commercial America.*]

Cotton Is King

In looking over the preliminary figures of the exports of the United States for the fiscal year ended with June 30, 1914, just made public by the Department of Commerce, record-breaking exports of raw cotton stand out prominently in a period marked by general declines. The value of the exports of this staple for the year was 610 million dollars.

This high record was due, however, to the higher prices realized rather than to the quantity exported. The number of bales sent out of the country in the fiscal year just over was 9,165,000, or 1,500,000 less than the record quantity of 1912. But the average export price per pound in the fiscal year 1914 was 12.8 cents as against 10.2 cents in 1912.

The United Kingdom and Germany took more than two-thirds of the cotton exported from the United States in the fiscal year 1914, the total to the United Kingdom having been 3,452,000 bales, valued at 232 million dollars, and that to Germany, 2,785,000 bales, valued at 182 million dollars.

Over one million bales valued at 74 million dollars went to France. Shipments varying in amount from 517,000 to 102,000 bales were made to Italy, Japan, Spain, Belgium, Canada and Austria Hungary. This country also sent 95,000 bales to Russia, besides large indirect shipments credited to intermediate countries. European countries as a whole took 8,638,000 bales, or 94.3 per cent of the total American exports; Japan, Canada and Mexico, 516,000 bales, or 5.6 per cent, and the rest of the world, only 11,000 bales, about one-tenth of one per cent of the total.

The value of the exports of raw cotton from the United States has more than doubled in the last twelve years. In 1902, the total was 291 million dollars, and in 1914, as already stated, 610 million. About two-thirds of the domestic production of this great staple is now exported. The number of bales reported by the Bureau of the Census as being ginned in the cotton year was 13,965,000, and the exports for the fiscal year, as already referred to, were 9,165,000 bales.

These figures prove beyond a shadow of doubt the right of cotton to be called king of American exports. More than that, they suggest that there is no danger in the immediate future of its being dethroned. Countries in which cotton spinning is an important industry are making every effort to increase the cultivation of this staple, either within the national boundaries or in the colonies and dependencies. These efforts are meeting with some success, particularly in Russia, India and Egypt. But it would seem nature had endowed the southern part of the United States with conditions of soil and climate so well suited for the cultivation of the cotton plant, that efforts for its successful growth on a large scale in other parts of the world must labor under a certain handicap.

It may be that the exports of this staple from the United States will fall off in future years,* or remain stationary. If such should be the case the reason will be found probably, not in the competition of other cotton producing sections nor in a falling off in the demand for the American product by the spinners of other countries, but in the larger demands of an increasing cotton manufacturing industry in the United States. That country derives the greatest benefit from its export trade which ships its products abroad in the highest possible manufactured form.—[*Commercial America.*]

COTTON AND THE WAR

Editor's Note. *This review was written before Great Britain, France, Germany, Belgium, Austria Hungary, Russia, and other European countries went to war in the summer of 1914 and the market for 7 or 8 million bales of American cotton was cut off. Suggestions that the United States government take up the valorization of cotton, as Brazil did with her coffee crop some years ago, have met with little favor. The buy-a-bale-of-cotton movement is not widespread, and the cotton raising industry of this country faces a crisis, with no very promising prospect for 1915.

The JOURNAL of GEOGRAPHY

Volume XIII DECEMBER 1914 Number 4

WAR AND THE FOOD SUPPLY IN EUROPE.

By V. C. Finch
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CONTINUED prosecution of war by an isolated nation depends ultimately upon what that nation can produce. Many things are needed: metals, fuel, animals for draft, feed for animals, men and food. Food not only for those at the front but for the great armies of non-combatants. The present situation in Europe has led to inquiries into the abilities of the countries involved in war to support themselves. For Germany and Austria-Hungary in particular this is a matter of extreme moment. Their central location and undemonstrated naval strength cuts them off from any important over-sea food supply.

The great expansion of industrial and commercial interests in recent decades has created in most European countries a basis for populations much in excess of those which exist in the same countries under purely agricultural conditions. Of the countries at war Belgium and England have the largest proportion of industrial population. Germany and France also rank high in this respect while Hungary and Russia still are dominantly agricultural. In the latter country about 85 per cent of the total population live in rural communities.

So far as the human population of Europe is concerned, among the least dispensable food products are wheat, rye, potatoes, pork, and beef. Other grains and other animals are of no less importance but to consider them would require a study of greater length than is here possible. In normal times the areas in which these staples are produced are distributed in accordance with the workings of certain economic and geographic forces such as the distance and size of markets, value of land, difficulty of transportation, nature of climate or quality of soil. Of these conditions not the least are geographic.

Wheat is native to the sunny lands of the Mediterranean region and in western Europe is to be found chiefly in the dryer parts of England and France where the glacial, alluvial and residual soils are of high fertility. Figure 1, based on statistics of area, somewhat exaggerates the wheat production of Russia as against that of western Europe. The low rainfall and rich, black earth of southern Russia make it a region admirably suited to wheat culture and the area sown is large, but poor agricultural methods give a low yield. France with its small area ranks third in the world's production of this cereal. Germany is not an important wheat producer, partly due no doubt to national prejudice but also to summers with lower temperature and higher humidity and to a soil in many places too light for wheat culture.

Rye furnishes the chief bread-stuff of Germany and in fact of the peasants

Fig. 1. The distribution of wheat in Europe reflects the distribution of sunny climates and rich level lands. There are exceptions to both.

Fig. 2. The distribution of rye in Europe is almost perfectly complementary to that of wheat. It is found in the colder regions, the poorer soils or rougher topography.

[These five maps appeared in the *American Review of Reviews*, November, 1914].

of Russia. In nutritive value it is not inferior to wheat and it has the advantage of giving a better yield on poorer soil and in less favorable climates. Thus it is much grown on the sandy plain of north Germany, the hilly regions of central and south Germany and the cooler and moister central Russia (Fig. 2). The crop of Russia exceeds that of Germany and Austria-Hungary combined. In France rye reaches an important acreage only in the Auvergne Plateau, the poverty spot of the country.

Fig. 3. The distribution of potatoes in Europe is greatly in favor of Germany and Austria. Even Ireland is but a small competitor. Geographic conditions only partly explain it.

The importance of the rye crop in European economy is often underestimated in America. In the five years from 1895 to 1899, rye formed 49 per cent and wheat 51 per cent of the combined crop of these cereals in Europe. Of the world's crop of wheat in this time Europe produced only 55.5 per cent, of the world's crop of rye 94.1 per cent (*U. S. Dept. of Agriculture, Year Book,* 1900, page 167).

Whether the supply of these grains in Germany is sufficient to meet the local need is a problem much argued both inside and outside that country. Count von Moltke is inclined to an optimistic view, citing as evidence the fact that Germany has of recent years lessened her import of bread-stuffs. Dr. Ballod, a German economist, in differing with him (*Literary Digest,* October 17, 1914) supports his position with the assertion that fifteen years ago it might have been possible for Germany to subsist upon cereals produced within her own borders but that today it is no longer so because the absence of im-

Fig. 4. The distribution of swine in Europe is partly explained by the potatoes of Germany, the corn of Hungary and France and the oak forests of France, Spain and Portugal.

Fig. 5. The distribution of cattle in Europe is largely a question of pasture. Their relative absence from the Mediterranean coasts with their dry is especially to be noted.

ported feed for cattle will seriously interfere with beef, milk, and pork production and bring a larger demand upon the local grain supply for food, larger in all probability than can be met. Prof. F. Wohltmann of Halle, Germany, believes that areas of production of foodstuffs can be increased and additional supplies drawn from Roumania, Belgium, and other areas outside, so that Germany is not in danger of being starved out.—(*Deutsche Tageszeitung,* Sept. 22, 1914). Some of these sources of supply seem decidedly doubtful. Indications are that the cereal crop of Germany is normal this year and that there was ample labor to harvest it.

Potatoes are Germany's most important hoed crop, occupying 12 per cent of the total cultivated area, while all other hoed crops together cover only 4 per cent. The 8½ million acres devoted to the crop is more than double that in the United States and the harvest of 40 million tons more than four times our total. (*Mo. Bull. Agric. Intelligence and Plant Diseases,* Sept., 1913). (*U. S. Dept. Agric. Bull.* 47). Of this immense crop about 13 million tons are used for human food, 16 millions for cattle feed, 2½ millions for distilling and ½ million for drying. Of these dried potatoes a flour is made which may to some extent supplement wheat and rye flour. The per capita consumption of potatoes in Germany is 7.3 bu. per year. In the United States it is about 2.6 bu. (The 1914 potato crop in Germany is reported to be about 80 million tons, double the above average figure).

It is fortunate for Germany's meat supply that the economic pressure of growing industrialism has during past decades caused a great decline in the sheep industry with a corresponding increase in the production of swine. The omnivorous tastes of this animal combined with the shortness of the period in which it attains a marketable size and the excellence of pork products for food are decidedly in favor of its production at this time (Fig. 4). The most recent census shows Germany to be capable of producing about 8 million beef animals, 5 million sheep and 26 million hogs per year. (*Dernburg: Am. Review of Reviews,* Nov., 1914).

As concerns the supply of beef and milk-producing cattle Germany seems to be at a disadvantage. Cattle in Europe depend much upon pastures. The mild humid coastlands of France, Belgium, Holland and Denmark show the greatest cattle concentration (Fig. 5). Ireland also is an important storehouse of cattle for England. These supplies however would not suffice if importations were stopped. Germany is certainly not better off and importation for her is impossible. If a meat supply is to be developed within her borders, it will doubtless be through hog-raising. Germany now leads Europe in the magnitude of this branch of animal industry. Moreover, pork has the advantage of maturing in one year instead of two or three and of making growth on a wider range of feed products than cattle. It is feared, however, that grain shortage will curtail all forms of animal industry.

THE GEOGRAPHICAL CONDITIONS OF NATIONAL DEFENSE.

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CENTRAL Europe is full, at the present day,* of a rich and civilised life. It has blossomed in the sunshine of peace, and only under this star can go on prospering undisturbed. But a love of peace on the part of the populations who inhabit it is not all that is necessary. Central Europe has been the battlefield of foreign peoples, the object and the prey of conquering neighbours, and can never forget that constant thought and constant labour are necessary in order to be ever ready in defence of its soil and its industry. There is no other part of Europe whose position, in case a fresh military period were to set the world in flames, would be so much threatened as would that of Central Europe. Who can dare to say that such dangers as were undergone by Ferdinand the Second and Frederick the Second may not once more befall the powers of Central Europe? Would they be strong enough if the cry "Enemies all around" were once more to compel them to lay their hands to the sword? In answering this serious question geographical facts take a decisive part, and invite us to survey the means of defence along the frontiers.

The western border of Central Europe is that which has undergone most variation during recent centuries, and has been the subject of most recent conflict. Here, even in the present day, is the most serious point of tension. In opposition to the French efforts at expansion, which at one time succeeded in setting back this frontier as far as the Baltic, the European Powers took measures, at the Congress of Vienna in 1815, to protect Germany, which, owing to its divisions, was at that time weaker than it is now. Switzerland and the kingdom of the United Netherlands were created as buffer states. The neutrality secured to these was also promised in 1832 to the newly formed kingdom of Belgium. The value of this protection on both flanks of the western frontier of Germany does not depend solely upon the security of international agreement and the doubtful readiness of the guarantors to protect this neutrality by force of arms. The neutral states themselves have shown, by the measures of self-defence which they have undertaken, that they are not disposed to let themselves be involved without resistance in the quarrels of their neighbours. It remains, however, somewhat uncertain whether they would have resolution

* The following extract from Chapter XX of Partsch's book on *Central Europe* was written in 1899, first appearing in English in 1903—in Appleton's *World Series, The Regions of the World*, edited by H. J. Mackinder. It is reprinted here because of especial interest in connection with the war in Europe.

Central Europe, as treated in masterly fashion by Partsch, includes Germany and Austria-Hungary, with Belgium, Netherlands, and Switzerland on the west and Roumania, Bulgaria, Servia, and Montenegro on the southeast. Certain paragraphs referring to these smaller countries except Belgium and Netherlands are here omitted.

enough to throw their defensive power quickly and emphatically into the balance against the invader of their neutrality.

This is all the more doubtful, because the temptation not to respect neutral territory only arises when a strong militant power has already obtained considerable advantages and its superiority begins to be decisive. As long as both adversaries face each other in the fulness of their power, neither could venture, unpunished, to turn the flank of the other by crossing a narrow strip of neighbouring neutral country. But when the strength of the two parties begins to be unequal, the stronger may attempt by thus reaching across to hasten the final decision, and to protect itself against reverses. In any case, it is obvious that Germany could never have anything to gain by taking this course. Aix-la-Chapelle lies 264 miles distant from Paris and Metz 200 miles, and the way through the fortresses of the Sambre to Paris is not easier for a German attacking army than that by way of Verdun. Nor could a march through Switzerland give any greater advantage to German troops. Why should they expose themselves to the difficulties and dangers of crossing the Swiss Rhine country and the Jura, when beyond these great obstacles they would still find themselves confronted by the same French fortifications that directly touch German territory at the gate of Belfort? Nor could an alliance with Italy ever lead Germany into the error of taking an army to be useless in the blind alley of Switzerland, shut in by the Jura. It would be madness to purchase a co-operation with Italy on Swiss ground by an invasion of Switzerland, for an expedition north of the Alps would demand far greater powers than Italy could ever spare from her home defences.

With France the case is different. If the defensive power of Germany should be diminished along the Rhine, either by reverses or by the requirements of some war at a distance, France might hope, by advancing through Belgium, to enter Germany at the less protected northern end of the west frontier, to combine operations with its own navy, and in case of a simultaneous attack from Russia, to strike the severest blow at the enemy, who would lie between two hostile forces. Or if the German army of the Rhine were weakened and obliged to confine itself to defending the fortifications, the advance of a French army through North Switzerland into the heart of South Germany might be even more tempting. These are the possibilities which the neutral states have seriously to keep in mind in the preparations for the defence of their neutrality. The defensive preparations of Switzerland, at any rate, seem to be guided by quite other views, and to propose a resistance in the inmost parts of the territory. . . . The whole salvation of Switzerland would depend upon its making a firm stand for the complete inviolability of its territory.

While that country has natural defences against the foreign invader in its mountains, its rapid and abundant rivers, and its broad lakes, the natural position of Belgium is not so secure. Its territory is intersected by the mili-

tary road along the Sambre and the Meuse that has been used in so many wars. In any conflict between the two adjoining powers, the shortest line between the objectives of the operations on both sides, Paris and Berlin, would pass along it, and would lead through rich highly cultivated country, offering relatively little natural hindrance. It is, therefore, of extreme importance that Belgium has not, like Switzerland, contented itself with preparing a refuge for its military power, as far as possible from the border, but has closed the line of the Meuse at the very frontier by the great fortified places of Liège and Namur, which bar the way against both Powers. The chief strength of Belgium would not, however, be stationed here, but would be collected in a great fortress lying aside from this line—Antwerp. This position offers the advantage of being protected on the south by the line of water formed by the union of the rivers Nethe, Rupel, and Scheldt. Beyond these rivers, the most important crossing-places of which are fortified, lies the circle, nine miles in diameter, of Antwerp's fourteen new forts, which have quite altered the character of an old fortified place that used to depend upon a ring of waters. The forts are especially strong towards the sea. It is obvious that the choice of this spot—which indeed is by nature well adapted for defence—has been in part decided by the hope of help from without. And indeed England's policy could never suffer any of the great Continental Powers to gain a firm foothold exactly opposite to the Thames, and, as Pitt expressed it, "to hold a pistol to England's breast."

The example of this strong fortification of the environs of Antwerp may have contributed to make Holland prepare its national defences with so much insight and caution. As in former centuries, the strength of Holland still lies in the great expanse of country that can be flooded. This protection is only lost in very severe winters, such as that of 1794-95. The "new water-line" from the Zuyder Zee to the Lek, protected by Utrecht and a number of smaller fortifications, is, together with its continuation to the junction of the Meuse and Waal, Holland's principal line of defence towards the east; while, on the south, rivers that widen into real arms of the sea forbid any hostile approach. Safely sheltered behind this protected belt of waters lies the principal fortress of the country, Amsterdam, surrounded by a wide ring of forts and a territory within its own power to inundate. The surrounding defences are completed by the fort of Ijmuiden at the entrance to the North Sea Canal, and by the forts around Helder, which close not only the entrance to the North Holland Canal but also that to the Zuyder Zee, and so prevent the passage towards Amsterdam of hostile ships or of materials for a siege.

The peaceful dispositions and the good state of defence of its three neighbours on the west are of great importance to Germany in the task of defending its 150 miles of frontier against France. The acquisitions of the last great war, which restored the losses of centuries, altered the conditions of national defence fundamentally and to the advantage of Germany. Whereas

the former frontier used to be the Rhine, which served to conceal the military preparations of France, and whereas the fortress of Strassburg used to be a direct menace to the safety of South Germany, the river, from Basle to the frontier of Holland, is now once more entirely in the hands of the Germans. If there were danger of war, the line of the Rhine would cover the strategic advance of the German forces. Between Basle and Mayence the river is crossed upon German territory by eleven railway bridges and sixteen pontoon bridges. Beyond the river, Upper Alsace is covered by the broad and wooded mountains of the Vosges; and where these mountains end, and the Saar basin is bordered by low hills, eight lines of railway run from the reach of the Rhine between Strassburg and Cologne towards the westward projection of the frontier of Lorraine. The newly acquired line of the Moselle is here protected by the mighty fortress of Metz, the new forts of which form a circle round the town five miles in diameter, and more to the north, close to the frontier of Luxemburg, by Diedenhofen. It would be between Metz and the northern end of the Vosges, as a glance at the railway map will show us, in front of the Saar and behind the Seille, that the main defending force of Germany would probably collect. Military writers consider the fields round Lunéville and Nancy as the probable scene of the first decisive action in any future war. Its result would decide whether an advance upon the first French line of defence, supported by the Upper Moselle and Meuse and by the great fortress of Epinal, Toul, and Verdun, were possible for the German army, or whether the French could open their advance upon the Rhine towards the great places of Strassburg and Mayence.

If the neutrality of Belgium were to be violated by France, Cologne would become the central point of defence, and in the course of the last twenty or thirty years nothing has been spared to bring its fortifications into the best and most modern condition; the importance of Wesel, too, has not been forgotten. If an advance should be made through the Gate of Belfort and North Switzerland towards the interior of South Germany, the French would indeed find, if they avoided the fortified places of Breisach and Istein, that the whole reach of the Rhine which lies between Germany and Switzerland, from Basle up to Constance, is unprotected; but the modernised fortresses of Ulm and Ingolstadt would oppose a barrier, and even under great difficulties would secure time for the German military leaders to collect sufficient forces on the Danube, or to carry out serious operations against the enemy's communications.

Any attack upon the western frontier of Germany would probably, in the present preponderance of the French navy, be accompanied by a threatening of the German coasts. The experiences of the last war should not lead to the underestimation of this danger. In the North Sea, the shallows impede the approach of hostile vessels. Nothing, however, has been left undone in the defences of the naval station of Wilhelmshaven, and of the mouths of

the rivers Elbe and Weser. The acquisition of the Island of Heligoland is of ambiguous value. While this little rocky inlet remained in the hands of England, Germany might at any time have had the annoyance of seeing a hostile fleet collect there, but now that it is protected by German batteries it makes an outlying point open to the first attack. The mouth of the Elbe has become a more important place since it received the North Sea and Baltic Canal. The two extremities of the canal are not much exposed to danger; the more easterly lies in the middle of Kiel Harbour, and is covered by strong fortifications at its entrance. To protect its course through Holstein, if it were threatened by a force that had landed, say, in Jutland, would be more difficult.

The coasts of the Baltic, owing to their extent, are inconvenient to fortify, and are not so naturally difficult of approach as the shallows of the North Sea. The best protection here consists in a line of railway running along the coast, and ready to carry help to any point threatened. The important commercial inlets, however, are fortified, or else ready to be closed by torpedoes in case of war. Fortunately the large towns lie far back, out of danger of bombardment, a good way up the mouths of rivers, and in some cases at the end of broad haffs. Two of them, Danzig and Königsberg, are already among the strongest defensive positions along the eastern frontier.

If France were to conspire with the giant Empire of the east for the destruction of the German Empire, it would help to bring about its own ruin and the slavery of its future generations. The unlimited growth of the Russian Empire, and the disturbance of the balance of power in the interior of Europe to the advantage of Russia, which already contains more than a quarter of all the inhabitants of the Continent, do undoubtedly constitute a danger to the whole Germanic, and also to the whole Latin world. The danger is but little lessened by the consideration that there are no grave interests in dispute between Russia and Germany. While it is certain that Germany will never covet a square mile of Russian soil, no one can answer for it that the Russian Colossus, in its unceasing expansion, may not some day attempt once more to push its western frontier forward. No natural barriers, difficult to cross, protect Germany on the east. Only the power of the German people to defend itself can protect this boundary.

The task is rendered more difficult by the length and its retreating curve to the westward. The frontier measures 750 miles from Memel to the Three-Emperors Corner at Myslowitz, and while the direct line from the eastern ends of East Prussia and Silesia passes through Warsaw, the Russian territory on the Middle Warta pushes so far westward that Berlin stands at a distance of only 180 miles from the frontier. This wedge of Poland points menacingly towards the German capital, and leaves the military strength of Russia free to choose upon what part of the long frontier line it will direct the full force of its onset. East Prussia, surrounded on the south, east, and north by Russian territory, exposed on the north-west to the attack of the Rus-

sian Baltic fleet, is connected with the main body of the Empire only by a length of 75 miles and lies in the greatest danger. The first effort of any Russian attack would be to paralyse this wing of the Prussian eagle. If the armies of Germany were compelled to act on the defensive here, they would find their task lightened only along the southern border, where there are woods and the tangled waters of Masuria. Between the long lakes with their many arms, the roads have to go across narrow passages which would be easy to defend, even if the closing of them had not been prepared in time of peace, by building little forts like Fort Boyen at Lötzen. For great hostile undertakings this tract of country is in any case less suitable. The natural lines of Russian advance are the broad valleys of the Pregel and the Vistula. The Russian railway system has prepared, in the junctions of Vilna and Warsaw, points of departure for both these lines of attack. The fortifications of Kovno, at the crossing of the Niemen, form a base from which an army which was not opposed by an equal force would find the way open through the Pregel district as far as Königsberg. A wide ring of forts has of late years made this place into a fortress of the first rank, which cannot be fully surrounded so long as the Frische Haff with its fortified entrance, the Pillauer Deep, are not in the enemy's hands. With Königsberg as a base, a lesser Prussian army might maintain its footing upon the island of the coast between the Haffs and the mouths of the Pregel, whose branches fall into them; or, stationed behind the Deime and the Alle, such an army could protect all East Prussia. Its situation would only be seriously endangered if a Russian army from the Vistula were to gain a decisive success, and to cut East Prussia's communications on the west. The strong fortifications on the line of the Vistula have been erected to meet this danger. Thorn, in particular, has a large ring of detached forts commanding both banks of the river, and able with an energetic and active garrison to extend their influence north-eastward, as far as the Prussian lake country, and south-westward as far as the lakes of the Upper Netze. Only 30 miles further to the north lies Graudenz at the head of an important bridge, which has recently been strongly fortified, and lies half-way between Thorn and the delta of the Vistula. The area of the delta ready for inundation strengthens the position of Dantzig, which the forts on the western hills and at the mouths of the river have made into a spot most capable of being defended. It is connected with Königsberg on one side by the Frische Haff.

With the great military strength which Russia has at command, it would undoubtedly be possible that, simultaneously with an invasion along the Pregel and Vistula, an advance should be attempted towards Berlin. The advancing army on the left bank of the Vistula would be threatened on the flank by Thorn, and could not go on until it had completely invested this fortress; but if it did succeed in reaching the eastern border of the province of Posen, it would come into a country much cut up by long lakes running from north to south and offering many positions favourable to the defence. Beyond lies the reach of the Warta that runs northward, and upon it the strong fort-

ress of Posen. Here the lines of communication from all the eastern portions of the Empire converge. An interruption of these communications, by the surrounding of Posen, would be a heavy blow which the German military leaders would have to use every exertion to prevent. The wide ring of forts and the modern methods of construction give to Posen a great power of resistance to a siege, the materials for which would have to be brought from a great distance and by very difficult roads. Taken together, Königsberg, Dantzig, Thorn, and Posen form a ring of fortresses that enclose a natural division of territory and greatly enhance its powers of defence. The line of the Oder is of but secondary importance. Since the razing of the defences of Stettin, it has possessed but one strong fortress, Cüstrin, which has outlying forts, and stands at the embouchure of the Warta in a considerable area of easily flooded country. South of the Obra Bruch, which connects the Warta and the Oder, and bounds the sphere of influence belonging to the fortress of Posen, lies but one fortified place, at the head of a bridge, Glogau. Silesia is less important for the purpose of protecting the eastern frontier. It does not lie in the natural line of a Russian advance, and is in some degree defended by the far projection eastward of the Austrian Empire.

The whole conditions of national defence along this eastern frontier, with its unfavourable peculiarities, suggest that this border cannot be satisfactorily held on the defensive, and that serious injury can only be averted by a vigorous offensive. In the eastern provinces where no river runs, like the Rhine, parallel with the frontier, making a basis of defence, the place of some such basis would have to be supplied artificially by railway lines running along the border. The carefully laid out system of communications has everywhere created two, and sometimes for long distances three, independent lines of railway running parallel with the frontier, and these—if satisfactorily secured against destructive attacks by bodies of Russian cavalry—would render possible a rapid displacement of troops. They can, however, only be so guarded by a considerable advance of German troops. As the different size of the areas to be covered and the differences in railway development in the two empires would undoubtedly assure to the Germans the advantage of being more quickly ready for battle, it is obvious that Russia must reckon, in case of war, upon taking up at first a purely defensive attitude. She has prepared for it by constructing the square of Polish fortresses—Novo Georgiewsk, Ivangorod, Brest-Litewski, and Goniondz—which will enable her to collect her forces behind the great river frontage of the Bobr, Narew, Bug, and Vistula, and there to await with confidence the approach of any attack. Warsaw has also been made into a stronghold.

This conception of the position depends upon the paucity of railways, economically so much required in the great district on the left bank of the Vistula. Russia trusts for protection, even in this first stage of a war, to her superfluity of space, and to that "fifth element" which Napoleon discovered

with terror—the unfathomable mud of the roadway, which paralyses the most active strategy and tires the most valorous soldiers. The offensive side of national defence therefore presents serious difficulties to Germany. But the rich cultivation and increased population of Poland have in the course of a century changed the character of the battlefields, and deprived Russia of the exceptional position which she appeared to occupy after the experiences of Napoleon. The Russian Empire cannot be regarded as so invulnerable and so unapproachable for hostile troops at the present day as it was in 1812. The method of defence which was possible then cannot be repeated.

Calm and expert judges are inclined not to overestimate the danger of a war with Russia. Much would of course depend upon whether Germany had to bear all the weight of it alone, or whether it could reckon on the aid of its present ally, Austria-Hungary. The position of that power in regard to Russia is essentially different. The greater part of the Empire is sheltered by the Carpathians. Only Silesia, Galicia, and the Bukovina stretch down into the plain of Eastern Europe, and absolutely demand an armed defence against their great neighbour. Three railways lead from Moravia and five from Hungary into the district where the Oder rises, and into the basins of the Vistula and Dniester. Of these railways, six debouch into the valleys of the Vistula and San, behind which the principal defensive force would have to assemble, supported by the two great fortresses of Cracow and Przemysl, which are connected by two independent lines. Use could also be made of the lines in the valleys of the Waag and the Hernad, deep in the mountains, if troops had to be carried from one side to the other. The choice of two points of concentration at only 150 miles apart bears witness clearly enough of the conviction that a strip of land so long, and at the ends so narrow, as the outer border of the Carpathians from Teschen to Czernowitz (400 miles) can only be defended by forces held well together, and ready to take the offensive. The attraction of the enemy by a strong army serves better than a dispersion of forces to secure districts that lie at a distance. While the army of Cracow in a well-chosen position would face towards the Polish seat of war, and at the same time be ready, in case of an alliance, for co-operation with the German forces, the army of Przemysl and Lemberg would be required to advance towards Volhynia and Little Russia. In consequence of the division of the country into a northern and a southern field of operations, separated by the great marshy district of the Bug and the Pripet, this army would choose an independent aim, namely, Kiev. . . . . .

Although preparations are thus made for defence on the four faces of Central Europe and are continually perfected to meet the requirements of the times, we may, on the other hand, perceive in its interior a striking diminution of the friction between one state and another which was formerly so marked a defect. A general view of the defensive measures of Central Europe in the present day brings out, as at no previous time, the essential unity of this

great civilized region. Among all the alliances of our day, that between the two great Central European Powers is the most natural and has the strongest internal guarantees of permanence. If these two continue to hold together, not only will their smaller western neighbours be enabled, under the protection of their swords, still to enjoy prosperity and security, but the unruly peoples between the Adriatic and Black Seas will also learn to value and enjoy the blessings of peaceful industry. Central Europe has been the battlefield of all nations long enough to resist a recurrence of such sufferings with all its might and by a united movement of its millions of trained soldiers. May the great monument on the battlefield of Leipzig, where the criminal effort to enslave a whole continent was defeated, not by military skill, but by the elemental power of liberty-loving nations, remain the last memento of the political errors of previous centuries, a warning to all ambitious tyrants in the future, and an admonition to the peoples of Central Europe to remain united, to keep peace, and to command peace.

UNFAMILIAR NAMES IN THE GEOGRAPHY OF EUROPE.

Form used in parts of Europe.	*Nature and location of geographical feature.*	*Name usually used in America.*
Lüttich or Liuga	City in Belgium	Liege
Bruxelles	City in Belgium	Brussels
Anvers or Antwerpen	Largest port of Belgium	Antwerp
Escaut	River in Belgium and Holland	Schelde
Ryssel	City in France	Lille
Aachen	City in Germany	Aix-la-Chapelle
Elsass-Lothringen	Province in Germany	Alsace-Lorraine
Nord See or German Ocean	Sea east of British Isles	North Sea
La Manche or Der Kanal.	Body of water between England and France	English Channel
Köln	City in Germany	Cologne
's Gravenhage or Haag	Capital of Netherlands	The Hague
Pays Bas	Country of Europe	Netherlands or Holland
Weichsel	River in Germany and Russia	Vistula
Wien	Capital of Austria-Hungary	Vienna
München	City in Germany	Munich
Schwartzwald	Mountain range in Germany	Black Forest
Gand or Gent	City in Belgium	Ghent

Form used in parts of Europe.	*Nature and location of geographical feature.*	*Name usually used in America.*
Trier	City in Germany	Treves
Mainz	City in Germany	Mayence
Vlissingen	City in Netherlands	Flushing
Maas	River in France, Belgium and Holland	Meuse
Waal, Lek, and Ijssel	Names of the distributaries of the Rhine River in Holland, the Waal being the main Rhine and going by the name Maas in western Holland.	
Diedenhofen	City in Germany	Thionville
Donau	River in Germany, Austria-Hungary, and Balkan States	Danube
Lwów	City in Galicia	Lemberg
Krakau	City in Austrian Poland	Cracow
Genf	City in Switzerland	Geneva
Braunschweig	City in Germany	Brunswick
Brügge	City in Belgium	Bruges
Kjöbenhavn	Capital of Denmark	Copenhagen
Lac Léman or Genfer See	Lake in Switzerland and France	Lake Geneva
Bodensee	Lake in Switzerland and Germany	Lake Constance
Venedig	City in Italy	Venice
Bayern	Province in Germany	Bavaria
Böhmen	Province in Austria	Bohemia
Russ or Memel	River in Germany and Russia	Niemen
Byzantium or Stamboul	City in European Turkey	Constantinople
Livorno	City in Italy	Leghorn
Firenze	City in Italy	Florence
Cervin	Mountain in Swiss Alps	Matterhorn
Albania	Newly-constituted independent state north of Greece	
Liechtenstein	Independent principality between Austria and Switzerland	
Warszawa or Varsovie	City in Poland	Warsaw
Ofen Pest	City in Hungary	Buda Pest
Pas de Calais	Channel east of England	Strait of Dover
Petrograd	Capital of Russia	St. Petersburg

THE RUSSIAN CAMPAIGN IN GERMANY AND AUSTRIA.

By Lawrence Martin
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Geographical Features

THE Russian campaign against Germany and Austria has been carried on in a great plain between mountains and the sea.* The situation is similar to that in the war in western Europe, where the armies faced each other in October and November, 1914, along a continuous northwest-southeast line, 350 miles in length, from the Jura Mountains in Switzerland to the English Channel. In the eastern campaign the general direction of the sinuous line is more nearly north and south. In this case it will be recalled that the Carpathian Mountains (Fig. 1) are about 350 miles from the Baltic Sea and the line of campaign stretches across the plain in the states of (a) Austrian *Galicia,* (b) Russian *Poland,* and (c) German *East Prussia,* which are about as large as the states of South Carolina, New York, and Maryland plus Delaware, respectively. Little of the plain is as much as 700-1,000 feet above sea level. East Prussia contains a great ridge and is drained by the *Niemen* or Russ or Memel River and the smaller Pregel and Passarge Rivers which flow north to the Baltic. The master stream in the plain of Poland is the *Vistula* or Weichsel, whose three chief tributaries are (a) the Narev from the north, (b) the Bug from the east and southeast, and (c) the San from the south. In western Poland is the small River *Warta,* a tributary of the Oder. The Bug and San rise in Galicia, but most of the province drains southeastward to the Black Sea by the *Dniester.* The Carpathian foreland in Galicia is similar to the Swiss Plateau north of the Alps. Part of it is called the Podolian Plateau. The plain between the Carpathians and the Baltic contains much forest and many large swamps. The rivers have severe spring floods. North of the Podolian Plateau and east of the Bug River is the basin of the Pripet, a tributary of the Dnieper River. In its headwater region, just east of Poland, is the Pinsk Marsh, an area of morasses, trembling forests, and swamps, now partly

* The best English accounts of the geographical features of the field of the Russian campaign are to be found in Lyde's new book on *The Continent of Europe;* in Partsch's *Central Europe;* in Penck's *Carpathian Lands,* Altoff's *Russian Empire,* and Kirchoff's *German Empire,* all in Mill's International Geography; and the standard works of Reclus in *The Earth and Its Inhabitants* and Chisholm in *Stanford's Compendium of Geography and Travel.* Davis has briefly described the haffs of the Baltic Coast, near Danzig and Königsberg in East Prussia, and the valleys of the Rivers Vistula and Netze, near Bromberg west of Thorn, in a paper on *Large Scale Maps as Geographical Illustrations,* (Journal of Geology, Vol. IV, 1896, pp. 484-513), where he refers to the detailed maps. Among the good general maps for following the campaign are those in the large encyclopedias and atlases, and those in the inexpensive small atlases such as Sydow-Wagner's *Methodischer Schul-Atlas,* Bartholomew's *Comparative Atlas,* and Stanford's *Handy Atlas of Modern Geography.* Sheet XL in Romer's *Atlas Geograficzny* covers the whole eastern campaign very well on the scale of 1:5,000,000. The topography is unusually good, but the names are in Polish.

drained. It is 250 miles wide and covers about 35,000 square miles, being nearly as large as the state of Indiana. Because of remoteness from the ocean, the East Prussian ridge, Polish plain, and Carpathian foreland have hot summers and cold winters, a climate less favorable for a winter campaign than that of Belgium, France, and western Germany. The harbors of Riga and

Fig. 1. Map showing field of eastern campaign and its railways. (Modified from a French map issued in August, 1914, by War College Division, General Staff, United States Army). The name of Warsaw appears as *Varsovie*, Cracow as *Cracovie*, Baltic Sea as *Mer Baltique*, Poland as *Pologne*, East Prussia as *Prusse Orientale*.

Memel north of Königsberg are closed by winter ice for over 4 months, that of Danzig for less than three, that at Greifswald north of Berlin and west of Stettin not quite two, while the port of Lübeck east of Kiel is frozen only a little over a month, and Hamburg never has ice. This shows how the severity of the winter increases from west to east.

Russian Advance, Retreat, and Readvance In Prussia.

The international boundary traverses a plain and seems to be determined by no natural geographical features. Consequently it was easy, while Ger-

many was engaged in her unsuccessful lightning campaign against Paris, for the Russians to invade East Prussia where they chose, as soon as Germany declared war on Russia the first day of August. The facts and dates cited in this article were obtained from the New York and Chicago daily papers, from the weekly issues of two American periodicals (the *Nation* and the *Literary Digest*) two German papers (the *Deutsche Tageszeitung* and the *Tägliche Rundschau* of Berlin) and the weekly edition of the London *Times*.

Northeastern Prussia is a lowland with many swamps, but southward near the Russian frontier is the Baltic Ridge, an enormous terminal moraine of the Scandinavian ice sheet with rough topography, hills reaching an altitude of 500 to 1000 feet, and great numbers of lakes. The lake district is called Masuria. The extent to which these topographic features have figured in determining exact routes and affecting battles in the campaign in East Prussia is not apparent from the meagre newspaper dispatches thus far available. The Russian invasion followed three lines, crossing the Prussion frontier on August 16th (a) at Eydtkuhnen (Fig. 2) east of Königsberg, (b) near Lyck, 50 miles to the south, and (c) at Neidenburg, 80 miles farther to the southwest. Northern Germany, east of the Vistula, projects some 160 miles farther into Russia than do the southeastern states of Posen and Silesia, so that this Prussian campaign was evidently aimed at Königsberg and Danzig rather than at Berlin (Fig. 1) which is only 180 miles from the Polish frontier south of Thorn and east of Posen, or about as far as from Chicago to Indianapolis or from New York to Baltimore. This Prussian campaign may have been undertaken in order to divert German troops from the line opposing the Allies in northern France or from the main Russian army in Poland, or to prevent a flanking movement from East Prussia into northeastern Poland, or even in part for moral effect, as has been suggested regarding the French invasion of Alsace-Lorraine. This invasion came about almost exactly as was suggested over 15 years ago by Partsch in his remarkable analysis of the strategic geography of this situation (see "Geographical Conditions of National Defense," printed elsewhere in this magazine).

Gumbinnen, 20 miles inside the Prussian frontier, was reached in 3 or 4 days, then Insterburg and Tilset, and finally points only 17 to 35 miles from Königsberg. Farther to the southwest Bialla, Johannisburg, Ortelsburg and Soldau fell into the hands of the Russians the last week in August, although the Germans had won skirmishes at some of these places earlier in the month and actually held Mlawa, 5 miles inside the Russian frontier, on August 18th. By August 28th the Russians had advanced 50 to 70 miles into Prussia, reaching the dashed line in Fig. 2. The area invested is largely inhabited by Poles, while the region to the north near the Baltic has Germans. There was fighting at Allenstein nearly 60 miles from the boundary. Here the Germans won an important victory, as they did also at Tannenburg in the terminal moraine south of Osterode on August 29th, where the Russians lost many

men. Being reinforced by troops from the French campaign, the Germans drove the Russians back out of Prussia by the middle of September and 50 miles into Russia to Grodno on the River Niemen, along which a week-long battle was fought about the last of September. The only geographical feature which seems to have counted in this part of the campaign is the River Niemen, whose shallow valley was not a strong natural line of defense, and yet along which the Russians checked the German advance toward Vilna and Riga. Subsequently the Russians have readvanced to or past the Prussian frontier winning victories at Suwalki, Drusskeniki and Augustovo, the latter being a great five days battle ending about October 4 (Fig. 2). Lyck, which is 15 miles inside the German frontier, was re-occupied by the Russians on October 7th. Gumbinnen, Johannisburg, Soldau, Goldap, and Augerburg were taken by the Russians during the second and third weeks in November, the latter being 37 miles inside the German frontier. The tangle of glacial lakes in Masuria seems to favor the German defense, except when covered with winter ice. The 50 miles from Augerburg southwest to Johannisburg, for example, are without a place to cross, except at Lötzen where the narrow road between two crooked lakes is defended by a strong German fortress.

The absence of attack upon Königsberg, Memel, and Danzig by the Russian navy seems to be due partly to the geographical feature of shallow water in the haffs (lagoons) behind the nehrungs (sandbars with dunes) on the Baltic coast, but chiefly to the mines in the entrances to these three harbors and to the ease with which ships from the German fleet could proceed eastward from Kiel to the defense of these ports. It is not known whether the larger part of the Russian fleet is at Libau, which is 120 miles northeast of Königsberg and only 40 miles from the German frontier near Memel, or at Kronstadt near Petrograd, or at Helsingfors in Finland. It seems probable that it is not at Libau, where a small fleet of German vessels bombarded the town on August 8th and November 17th, attempting to blockade the port by sinking merchant vessels.

Austrian Defeat In Galicia and Poland

The second part of the eastern campaign has been fought out in Galicia and southeastern Poland, taking place at the same time as the fighting in East Prussia. Most of Galicia east of the San is inhabited by Russians. Austria north of the Carpathians is wide open to Russian invasion. The Podolian Plateau which is partly in Galicia and partly in Russia, has a 600 foot escarpment on the Russian side near the Bug and Dnieper Rivers, but the frontier has no topographic aid to defense. Less than a quarter of Galicia is forested. The Carpathian foreland has a height of 800 to 1500 feet so that the tributaries of the Dniester and the San have cut valleys 200 to 500 feet in depth and these seem to have guided the lines of invasion to some extent. By August 10th the Austrians had 3 army corps in the field east of Lemberg.

A corps consists of 30,000 to 50,000 men. The first skirmish occurred at Zalotche the next day, the Russians having invaded Austrian territory with the vanguard of the 6 corps which faced them. During the first week in September the Russians captured the fortified capital city, Lemberg, about 60 miles inside the Austrian frontier. They then besieged and isolated the great fortress of Przemysl, 55 miles farther west.

Early in August the Austrians had invaded southeastern Poland; and on August 21st they had 2 army corps north of Kielce, over 40 miles inside the Russian border, while 7 corps had crossed the River San and were heading toward Lublin. They were less than 90 miles southwest of the great Russian concentration camp at Brêst-Litefsk on the Bug River. They seem to have turned the Russians back near Krasnik, east of the San, in two battles during the last week in August. However, the Russians soon had a million and a half troops to face the Austrian million. They met along a line of battle 150 to 200 miles in length and the Austrians had to yield, but not without a stubborn series of fights. The Russians eventually drove the Austrians westward 60 or 70 miles over the Galician and Polish battlefields of Grodek, Rawaruska, Tomaszow, Lublin, and Ivangorod to the line of the Rivers San and Vistula, always apparently with the river valleys as temporarily effective factors. The valley of the San is 350 to 1000 feet in depth in some places. The swamps of the Galician and Polish Plains seem to have aided the Russians in the decimation of the Austrian army corps.

Halicz and Miklaiow, southeast of Lemberg were captured by the Russains by the middle of September and Jaroslaw and Chyrow near Przemysl before the end of the month. Although the great topographic barrier of the Carpathian mountain wall has protected Hungary from invasion, the passes have been entered by victorious Russians, who penetrated as far as Uzsok the latter part of September. Parties of Cossacks went 40 miles into Hungary to Ungvar. The hesitation along the San during October seems to mark only the reinforcement of the Austrian line by the Germans rather than any permanent turn in the tide. On October 29th the Russians were advancing west of the San, and if Przemysl falls they will doubtless move westward on Cracow, if indeed it does not surrender sooner, leaving an Austrian force trapped between the Russian army and the high Carpathians, with their snow-filled passes. Tarnow, which is less than 50 miles east of Cracow, was in the hands of the Russians between September 25th and the 1st of October, but was lost again, and then reoccupied on November 14th. Austria has been under the disadvantage of having two army corps in the western campaign in France for a time and a large force facing the Servians in Bosnia and Servia, as well as suffering from disease, the Asiatic cholera having broken out among the troops in Galicia about the middle of October.

Bukovina is an Austrian province southeast of Galicia and similar in topography. Nearly half its area is in forest. It is about half as large as

Massachusetts. No strong force has been sent against this unimportant province. Czernowitz, the capital, is reported as won and lost and won again by the Russians; and early in October a party of Russians had crossed the Carpathians and were at Rodna Pass in Transylvania. Bukovina is separated from Austria-Hungary by the great rampart of the Carpathians and inhabited wholly by peoples of Russian and Roumanian blood.

German Advances and Retreats In Poland

Between Galicia and East Prussia lies Poland, a low, rolling plain with its flat-lying young rocks almost completely covered by glacial deposits. It stands 250 to 700 feet above sea level, Lysa Gora, a small upland area near Kielce reaching 2000 feet. About one-fifth of Poland is forest. Its predominantly Polish population has certainly not been anti-Russian in sympathy during the campaign. Here the first months of the war were without notable activity. The undefended city of Lodz, 60 miles east of the German frontier and 90 miles north of Cracow was occupied by a German force early in September. The Germans invaded Poland in larger numbers the last week in September but were defeated at Kalisz on the frontier. Russian forces threatened Breslau 3 times during September, without success.

Considerably later the Germans entered Poland in force between Thorn, Kalisz and Cracow, rapidly penetrating 125 miles to the east of their frontier and driving the Russians back to Blonie and Senkocin. Here the Germans were within 8 to 14 miles of Warsaw, which was in serious danger of capture the second week in October. They seem to have held all Poland west of the Vistula at one time but never to have been able to cross the shallow valley of the Vistula, whose volume is such that it tends to be effective as a geographic barrier. From this position the Russians forced the Germans back, first outflanking them with cavalry from the fortress of Novo-Georgiewsk, northwest of Warsaw where the Bug enters the Vistula, so that the first week in November (Fig. 2) saw them driven more than 60 miles to the southwest, with difficult marshy country through which to retreat. The natural line on which they halted is that of the River Warta or Widawka. Along this river, 100 to 120 miles from Warsaw and only 10 to 40 miles from the German boundary, engagements took place the 7th of November near Kolo, Warta, and Sieradz, as well as to the south near Czentochau. The next day the Russians crossed the German boundary to Pleschen, near Kalisz and 50 miles southeast of Posen. On November 9th the Germans were making a stand between the Warta and their frontier.

North of the Vistula near Plock, however, they were still within 70 miles of Warsaw, having reinforced their line with troops from Thorn and East Prussia, checking the Russian advance and driving them back after they had penetrated past Lipno (Fig. 2). On November 20th the Germans were again advancing near Novo-Radomsk, Kutno and Leczyca, though the last week in November saw the German army defeated near Lodz and split into 3 dangerously isolated forces between the Vistula and the Warta.

Fig. 2. Map showing approximate position of Russian, German, and Austrian forces at varied dates, the lines drawn in each case representing farthest advance of invading force at the time specified. Between Nov. 16th and 20th the Germans readvanced along the Vistula, driving the Russians back near Lipno and Kutno, but suffering what seems to be a disastrous defeat near Lodz the last week in November.

At the end of 3 months of fighting the whole eastern campaign has involved (a) Russian advance, retreat, and readvance in morainic East Prussia, (b) a thorough defeat for Austria in hilly central Galicia, (c) Austrian advance and retreat in swampy southeastern Poland, and (d) German

advance, retreat, and advance in the plain of southwest Poland. Russia has made no notable progress toward Berlin, which has no hilly country between, as Cracow has, and no mountain barrier as in the case of Vienna. It is highly creditable to Germany that her armies still spread out beyond both her eastern and western frontiers after three and one-half months of fighting, a period half as long as that of the whole Franco-Prussian war. On the other hand Russia has repulsed strong German forces near the Niemen and before Warsaw. She has reduced Austria to the position of a burden upon rather than an aid to Germany, and has demonstrated that her forces can advance effectively in the sort of topographic situations that separate her from the German capital, although the plain of eastern Germany could never be crossed with ease by an invading force. The lines of the rivers Vistula and Oder in Germany contain strong topographic positions for defense, though not as strong as those of the low mountains between Berlin, the Rhine, and France.

It does not seem probable that the entering of Turkey into the fray as an ally of Germany and Austria will complicate the campaign in eastern Germany. A more formidable enemy of both sides is the coming winter.

PETROLEUM AND THE WAR.

The Russian oil wells in the Caspian-Black Sea district are of importance in the present war, with the large use of gasoline for aeroplanes, automobiles, and trucks used in transporting food for the armies and in moving field artillery. There are oil wells in Galicia which Russia has captured from Austria-Hungary. In 1912 Russia ranked next to United States in petroleum production, Roumania being fourth and Galicia sixth. Germany has little petroleum, but she has a great quantity of potatoes, and probably an excess of sugar, and Hungary has much corn. As alcohol can be made from all three of these, there seemingly need be no shortage of fuel for internal-combustion engines in Germany, provided they are equipped to substitute alcohol for gasoline.

KIAU-CHAU.

Germany's only Asiatic possession is situated west of Korea. It is 350 miles north of Shanghai and about the same distance southeast of Peking, China, on the southern side of the Shantung Peninsula. This peninsula was formerly an island, being tied to the mainland by the delta of the Hoang Ho or Yellow River. On the northern side of the Shantung Peninsula is the British port of Weihaiwei. Tsing-Tau, the chief city of Kiau-Chau surrendered November 5th, after an eleven weeks' siege by the Japanese and British.

Graf von Pfeil describes Kiau-Chau in *Mill's International Geo*

as follows: "Kiau-chau is a large bay of 180 square miles area on the southern coast of the peninsula of Shantung. It takes its name from the "Glue city", 22 miles north of it. The Kiau river coming from the mountains in the eastern portion of Shantung brings down much sand, which causes the bay to silt up. The entrance of the bay, between two narrow spits of land, is about two miles wide and 20 fathoms deep. The landspits, together with the islands in the bay, are leased by Germany from China, while the German sphere of interest extends all round the bay for a distance of 31 miles. The climate is excellent, and quite that of the temperate zone; ice occurs in winter, but as it hardly ever covers the bay it does not form such an impediment to navigation as the fogs which are frequent on the coast further south, from which Kiau-chau is perfectly free. The greatest rainfall occurs in July and August. The inhabitants are agriculturists who have carried a system of irrigation to great perfection. The tidiness of their settlements is a mark of their prosperity. Kiau-chau is expected to prove valuable as an outlet for the great mineral wealth of Shantung."

The *Stateman's Yearbook* for 1914 gives this additional information: "Kiau-Chau, on the east coast of the Chinese province of Shan-tung, was seized by Germany in November, 1897; the town, harbour, and district were by treaty transferred to Germany on a 99 years' lease, March 6, 1898; and the district was declared a Protectorate of the German Empire, April 27, 1898. The administration is entrusted to the navy department, and a naval officer is governor.

Area, about 200 square miles, exclusive of the bay. There are 33 townships, and a population of about 192,000; white population with the garrison, 1913, 4,470 (Germans, 3,806). Surrounding the district and bay is a neutral zone, its area being about 2,500 square miles, and population about 1,200,000. There are 50 German schools for Chinese, mostly taught by missionaries. At Tsing-Tau there is a school for European children with 140 and a higher-class school with 145 pupils. For the year 1914 the sum required for administrative expenses was 16,787,625 marks (about $4,197,000). (Imperial subvention, 9,560,000 marks, $2,390,000). The garrison (3,125 men) consists of German marines, with a small force of Chinese soldiers.

The products are fruits, beans, ground-nuts, sweet potatoes, etc., and silk culture, coal mining, briquette-making, brewing, soap-making are carried on, and there is a prosperous silk factory. Over 1,000 Chinese are employed on the floating dock. At Kiau-Chau in 1911 the imports amounted to 114,938,000 marks ($28,734,500) and the exports to 80,295,000 marks ($20,073,000). The chief imports were raw cotton, cotton goods, and cotton yarn, metals, paper, sugar, and matches. The chief exports were straw braid, silk, ground nut and bean oil, and Shantung pongees. In 1911, 614 vessels of 1,070,000 tons entered at Kiau-Chau. 6,014 junks entered, and 5,550 cleared. A railway, Tsing-Tau to Poshan=272 miles."

ECONOMIC RESOURCES OF THE UNITED STATES.

THE peculiarly fortunate position of the United States in its ability to supply its own needs is clearly seen from a survey of its production and relative contributions to the world of the three great requirements of man—food, clothing and shelter.

It is found, for example, that the people of the United States may be fed readily by home-produced foodstuffs, the vast area of 3 2/3 million square miles representing every variety of climate and production and being nearly equal in extent to all Europe, which has a population five times that of this country. Agriculture in the United States has not yet reached the stage of scientific development common to many countries of Europe, and present domestic production may therefore be expected to increase greatly with more attention to improved methods of culture. Nevertheless, the United States already produces over 2,500 million bushels of corn, or two-thirds of the world supply. This year's wheat crop is estimated at the high record figure of 911 million bushels, about 20 per cent of the world harvest. The United States also produces annually over 1,000 million bushels of oats, or one-fourth of the international yield, and 197 million gallons of cottonseed oil, representing most of the annual output of this article whose food value as a substitute for olive oil is becoming more and more recognized.

Fifteen per cent of the world's cattle are on United States farms, the number in this country being 59 million, or twice as many as in Argentina or European Russia and half the number in India. This country also has 60 million swine, 50 million sheep and 24 million horses; it imports, however, 5,000 million pounds of sugar (chiefly Cuban), or 1½ times the amount produced in continental United States and its island territories.

In clothing material the United States is also favored, producing annually over 14 million bales of cotton, representing over one-half of the world's supply. Of wool, it produces 300 million pounds a year, the home requirements being supplemented by 238 million pounds of foreign wool and 34 million dollars' worth of woolen goods.

In the mineral kingdom, the pre-eminent position of the United States is unquestioned.* The country produces, for example, 534 million short tons of coal, 40 per cent of the world's output; 238 million barrels of petroleum, two-thirds of the world's total, and 57 million tons of iron ore, out of a world total of 132 million. One-half of the world's copper is taken from mines in the United States, which turned out 1½ million pounds in 1912. Of the world's output of 466 million dollars' worth of gold, the United States produced about 20 per cent, being exceeded only by South Africa. About 28 per cent of the world's silver and 30 per cent of its lead are produced in this country.

In the value of manufactures the United States leads the world, though

* See Journal of Geography for November, pp. 72-73.

the product of its factories is chiefly consumed at home. Of the 20,700 million dollars' worth of manufactures produced in the United States in 1909, only about five per cent was sold to foreign countries; the world market for iron and steel products, cotton goods, chemicals and other important products of industry being thus far largely held by England, Germany and other European nations.

	United States	Approximate share in world's total
Area	3,600,000 square miles	7 per cent
Population	102,000,000	6 " "
Corn product	2,600,000,000 bushels	68 " "
Wheat product	911,000,000 "	20 " "
Cotton product	14,000,000 bales	61 " "
Sugar product	3,577,000,000 pounds	10 " "
Tobacco product	791,000,000 "	35 " "
Number of cattle on farms	59,000,000	15 " "
Coal product	534,000,000 tons	40 " "
Petroleum product	238,000,000 barrels	63 " "
Copper product	1,243,000,000 pounds	55 " "
Iron ore	57,000,000 tons	42 " "
Gold product	$93,000,000	20 " "
Stock of gold	$1,880,000,000	22 " "
Value of all farm products	$9,751,000,000	No data
Value of manufactures	$20,672,000,000	No data
Imports in fiscal year 1914	$1,894,000,000	9 per cent
Exports in fiscal year 1914	$2,365,000,000	12 " "
Foreign trade in fiscal year 1914	$4,259,000,000	10 " "
Domestic trade in fiscal year 1914	$40,000,000,000	No data
Railways	259,000 miles	38 per cent
Aggregate wealth, estimated	$140,000,000,000	No data

[From *Commercial America*, Vol. XI, p. 13, Oct. 1914.]

HENRY GANNETT.

Henry Gannett died in Washington on November 5th from a complication of diseases after an illness of about a year. He was one of the leading American authorities in cartographic, statistical, and applied geography. He was 68 years old. As geographer of the United States Geological Survey for over 40 years, chairman of the United States Geographic Board, geographer of the 10th, 11th, and 12th censuses, and president of the National Geographic Society, his loss is a serious one. He published the best topographic map and the best rainfall map of this country, four books dealing with statistical geography, commercial geography, geography of the United States, and topographic methods, as well as statistical atlases of three federal census reports, census reports of three of our outlying possessions, lists of topographic maps showing the principal physiographic features, and more than 20 books dealing with altitudes, areas, boundaries, origin of place names, conservation, forests, magnetic declination, profiles of rivers, and geographic dictionaries of a dozen different states. Besides being extraordinarily competent in statistical and editorial work he was also a physiographer of ability, writing papers dealing with glacial erosion, climatic control of timber lines, etc. He

was chairman of the Research Committee of the National Geographic Society, and did much to make effective their scientific explorations in Alaska, South America, and elsewhere. Under his presidency the membership in the National Geographic Society has reached nearly a third of a million.

CURRENT GEOGRAPHICAL NOTES.

THE WEATHER AND CLIMATE OF CHICAGO. By Henry J. Cox and J. H. Armington. Bulletin No. 4, The Geographic Society of Chicago. University of Chicago Press, Chicago, Ill., 1914, xxv and 396 pages, pls. and figs. Price $3.00.

The progress of American climatology on a sound scientific basis has been much retarded by the lack of such complete detailed studies of climate as are available, in considerable numbers, for other countries. We need more of such monographs as that of Professor Oliver L. Fassig, on the climate and weather of Baltimore (1907). We need more of such detailed discussions of single climatic elements as that of Professor Alexander G. McAdie, on the rainfall of California (1914). We are gaining each year, but our progress has been lamentably slow. A thorough investigation of weather and climate, whether it be local, as in the case of a single city; or more general, as in the case of a larger district, or of the whole country, is therefore particularly welcome to those who are sincerely interested in the advance of American climatology, and who care about the position which our own contributions to this subdivision of the larger science of meteorology occupy in the world.

Professor H. J. Cox and Mr. J. H. Armington, of the local office of the Weather Bureau in Chicago, have done an excellent piece of work in preparing their monograph on the weather and climate of Chicago, and the Geographic Society of Chicago is to be congratulated on its publication as *Bulletin No.* 4 of that Society. We have, in this volume, a very complete presentation of all the generally recognized "standard" climatic data of Chicago, based (chiefly) upon the records from 1871 to date. And the essential results are shown in a large number of diagrams, many of which we believe might well be enlarged, by photography, for use in the schools of the city. There are several more or less "popular" aspects of Chicago's climate the discussion of which will be the first thing sought by most persons who take up this volume. Chicago, e. g., is well known as "the windy city," and the wind data will therefore be of particular interest to many readers. The presentation of these records is very complete, the author remarking (p. xxiv) "there is some reason for the sobriquet, although the wind movement here is not much greater than it is at other places in the Great Lakes region." Another feature of local interest is the effect of Lake Michigan, whose cooling influence in "breaking up" summer hot waves, and whose warming influence (when not extensively frozen) during winter cold waves is noted. In an appendix there is both a tabular and a graphic summary of

the weather on certain holidays (New Year's, Fourth of July, Christmas), based on the records for 1872-1913, which will naturally be of considerable local interest, although, of course, no one should use such summaries as forecasts for any particular year. The Chicago fire of 1871, it may be noted in passing, occurred at the end of a long period of drought, which finds its place in the list of "Dry Spells of Two Weeks or Longer" (pp. 194-196). There is commendable emphasis upon the correlation between wind direction and temperature and between the state of the sky and temperature, including curves to illustrate these important features, e. g., Figs. 29, 30, 58. We note, also, an interesting chart (Fig. 50) showing the snowfall during a "freak" snowstorm on Nov. 26, 1903, in which 14 inches of snow fell in South Chicago, near the lake, and practically none at all fell west of Halsted St. We are especially glad to see the discussion of weather types, and the numerous copies of barograph and thermograph curves, as, e. g., the examples of cold wave (Fig. 73), warm days (Fig. 74), lake influence during a hot wave (Fig. 26), etc. We call attention, in passing, to the fact that the chart showing the average annual snowfall for the United States (Fig. 48) has been superseded by a new map prepared by Charles F. Brooks and published in the *Quarterly Journal of the Royal Meteorological Society*, Vol. 39, 1913.

It is rather superfluous for the reviewer to suggest any additions to a discussion which is already so remarkably complete, but for our own part we wish very much that the authors had paid a good deal more attention to the weather, or cyclonic element; that they had laid more emphasis on the human relations; that they had made the whole picture of Chicago weather and climate more vivid, more interesting, more vital; that, in their consideration of special conditions, as droughts, or excessive rains, etc., they had taken account of the *causes* of those particular "spells," as illustrated by the daily weather maps. However, these may be the opinions of the reviewer alone, who heartily welcomes this new volume as a worthy contribution to American climatology.

R. DeC. WARD.

THE COPPER MINES OF NORTHERN MICHIGAN

THE mining of copper in Michigan antedates the earliest visits of European explorers to the region. The production on a commercial basis, however, dates from 1845, since which time the district has been a steady producer and an important factor in the copper industry of the world. To the close of 1913 Michigan has produced 5361 million pounds of copper, or 28 per cent of the output from the United States since 1845. For many years subsequent to 1845 Michigan was the most important copper-producing state and in total output it is second only to Montana. The entire output is from the Keweenaw Peninsula.

In the value of metal output, in the profits resulting from this output,

in the development of mining and metallurgical processes, and in the general high standing of the companies conducting the operations, the district takes high rank among the great mining camps of the world. Previous to the perfection of the electrolytic process of refining, "Lake" copper enjoyed the distinction of being the highest grade produced, and even to the present time it sells at a figure slightly higher than the copper from other districts.

Although the district has been an active producer for 65 years, most of the older mines still have large reserves of ore and new mines are being opened, while much territory remains to be prospected. Moreover, it is claimed that a large tonnage of the mill tailings produced when milling methods were less efficient than at present can be re-treated at a profit.

Perhaps the most important developments of the last few years are those in the southern part of the district, where the Lake mine and neighboring properties have disclosed what may prove to be large bodies of ore in a section of the district that hitherto has been less promising than the more fully developed area to the north.

The Lake Superior region is unique in being the only district from which a large output is derived from native copper. The rocks of the district comprise a thick series of lava flows and beds of conglomerate and sandstone of pre-Cambrian age. The copper occurs in the cellular portion of the lava flow, and as a cement and to some extent a replacement of the conglomerate pebbles forming the conglomerate. The native copper occurs in the lodes in masses varying from microscopic size to bodies weighing hundreds of tons. The richest lode mined at present carries but 1.5 per cent copper, and the poorest rock treated yields but little above five-tenths of 1 per cent of metal. For this low-grade ore to be profitable it must be handled on a large scale; this has resulted in the construction of the immense plants that characterize the Lake district. The lodes are worked for the most part through inclined shafts, though some of the deeper deposits are opened by vertical shafts. The workings have been extended in some cases to a mile in vertical depth, or about a mile and a half down the lode. Pillars of rock are left to keep the lodes open, and dry walls constructed from the waste sorted underground serve the same purpose in some of the mines. Much timber, however, is required in some of the mines, especially those operating on the conglomerate lodes.

The rock coming from the mines is crushed by steam stamps and concentrated, producing "mineral" containing an average of about 65 per cent copper.

The district is well located for cheap working of the mines. The Great Lakes furnish cheap transportation for both coal and copper, the Lake transportation being brought into the heart of the district by Portage Lake and the Houghton ship canal. The district is served by the Mineral Range, Cop[illegible] Range, and Keweenaw Central Railroads, and is connected with the [illegible]

lines of traffic by the Chicago, Milwaukee & St. Paul and the Duluth, South Shore & Atlantic railways.—[*Mineral Resources of the United States,*]

B. S. BUTLER.

ECUADOR'S CACAO CROP

Ecuador's cacao crop continues to increase. The value of the cacao for the period of 1913 was $2,650,602, and of 1914, $4,819,277. If these figures are an indication of the total year's exports of cacao from Guayaquil, they promise to reach 100,000,000 pounds. The export duties collected during the 1914 period aggregated more than $1,200,000.

Some idea of the magnitude of the cacao crop may be gained from the fact that the main streets of this city are almost wholly occupied by cacao beans, placed there to undergo the necessary curing process, and the wharves are covered to a height of several feet with the beans in bags ready for export. The enormous yield is the result of the increased acreage and greater number of trees planted in the last few years. This policy is being continued year after year, so that soon the cacao crop of Ecuador will far surpass present figures. So long as the cacao crop continues to be so bounteous, the Republic will occupy an independent financial position.

AMERICAN OIL DRILLERS IN CHINA

During early June, 1914, 19 expert oil-well drillers, of the Standard Oil Co., left Shanghai for Shensi Province in Northern China to make a practical investigation of oil possibilities. They are to proceed via Hankow, on the Yangtze River, thence to Honanfu on the railroad line between Hankow and Peking. From that point 40 days will be occupied in reaching the oil fields.

On the initial trip the party conveys 250 to 300 tons of American oil-drilling machinery, including cable tools for drilling. There are four outfits of this kind, besides two additional outfits of rotary machinery for soft formation work. This caravan is utilizing 300 Chinese carts and, as 40 days are required to reach the oil fields from the railway at Honanfu and an equal number of days in returning, 80 days will be occupied in taking each separate oil-drilling outfit into the interior.

It is anticipated, however, that only a short time will be required by the American experts to demonstrate the oil prospects in Northern China. The machinery sent in is capable of drilling a well 3,000 to 4,000 feet deep. At present some oil wells in the Shensi Province have been drilled 350 feet by Japanese. The American drilling follows an investigation by American geologists.

All the provisions and supplies for this extensive preliminary work are from the United States. The machinery was landed at Taku, near Tientsin, and from there transported by rail to Honanfu.

The commercial interests of China, generally, are deeply interested in the outcome of the Standard Oil investigations. The importation of kerosene into China for 1913 totaled 183,984,052 gallons, valued at $18,823,508 gold.

Tree Planting in the Philippines

A tree planting scheme for the Philippine Islands has recently been inaugurated by the consular Bureau of Forestry cooperating with the Bureau of Education. For several years the Forest School at Los Banos has been experimenting with tree planting. Out of several hundred tree species experimented with, six species have been found to thrive under adverse conditions, and to produce wood of value in the market. The species chosen, Teak, Molave, Narra, Lumbang, Lamutan, and Tuai, produce the strongest of woods for construction, and some of the most beautiful as cabinet woods.

The Bureau of Education has hundreds of school gardens and farms, and will plant the seeds and seedlings supplied by the Bureau of Forestry, and the nurserymen and rangers of the Forestry Bureau will actively cooperate with the schools in the venture. The Bureau of Public Works will also cooperate, planting seeds and seedlings along the highways. There are at present over 4000 miles of first class, rock-surfaced highways in the Islands and new roads are added at a rate of over a mile a day.

This whole movement is one of the largest significance, and well illustrates the wise foresight, and careful planning characteristic of Major Ahearn, chief forester, and Mr. Frank R. Crone, chief of the Bureau of Education.

J. Paul Goode.

Commercial Year of Egypt

As the result of the lowest Nile recorded for a century, some 400,000 acres of productive land remained unwatered. Had it not been for the augmented storage capacity provided through the heightening of the Aswan Dam in 1912, an almost total crop failure would undoubtedly have resulted. The rice crop was most affected and was almost a total failure. The cultivation of other food grains was greatly restricted so that as much as possible of the land supplied with water might be put under cotton. Grain foodstuffs and feed can be replaced by imported products. The depredations of the pink boll worm, Egypt's new cotton parasite, were more marked than during the 1912-13 season. The worm, which houses in the seed, destroys the seed's value, and it is this that causes the damage rather than the effect on the staple, provided, of course, that the worm does not attack the plant too early. Its presence in the seed makes necessary the most scrupulous care in selecting seed for the next season's planting.—[*Daily Consular and Trade Reports.*]

NEWS NOTES.

Professor William Morris Davis returned to the United States early in November, after spending nine months in the study of coral reefs in the South Seas and visiting Australia and New Zealand with the British Association for the Advancement of Science.

Professor Albert Perry Brigham has returned to his work at Colgate

University after spending a year in Europe. In August last, he gave a course of seven lectures before the Oxford University School of Geography upon the subject: Regional Development and Conservation Problems in the United States.

Professor J. Paul Goode of the University of Chicago and Professor Frank McMurry of Teachers College, Columbia University, addressed the sixty-second annual meeting of the Wisconsin Teachers Association in Milwaukee on November 5th and 6th, their respective subjects being "Japan," and "Teaching Pupils How to Study."

Mr. David T. Day has resigned from the United States Geological Survey to enter private practice. He has served the federal bureau for many years. A recent publication of the Geological Survey by Dr. Day is a colored wall map of the United States, 49 by 76 inches, sold for one dollar, and showing the oil and gas fields of the United States, and the principal pipe lines by which oil is transported from Kansas, Illinois, Indiana, Ohio, West Virginia, and Pennsylvania to the Atlantic coast at New York, Philadelphia, and Baltimore, and from Oklahoma and Texas to Sabine Pass and Port Arthur on the Gulf of Mexico northeast of Galveston.

Professor Eugen Oberhummer of the University of Vienna has been appointed visiting Austrian professor to Columbia University, where he will lecture during the second semester of the present year. Dr. Oberhummer lectured in the geography departments at Harvard, Yale, Columbia, Johns Hopkins, Chicago, Wisconsin, and other American universities in 1910.

The Association of American Geographers will hold its eleventh annual meeting at Chicago from December 29th to 31st, 1914, under the presidency of Professor A. P. Brigham.

Notice Regarding the Next Number

The Journal of Geography for January, 1915, will contain a *Supplementary List of Material on Geography which may be obtained Free or at Small Cost.* The list covers 22 printed pages and includes 465 titles. It has been prepared by Miss Mary Josephine Booth, librarian of the Eastern Illinois State Normal School at Charleston, Illinois. Teachers and superintendents desiring extra copies of this number may obtain them at a cost of 15 cents each, or 10 cents each in lots of five or more, by writing to the *Business Manager, Journal of Geography, Madison, Wis.*, before December 10th, and indicating the number of copies they desire. The similar list published in this magazine for January, 1914, is entirely out of print.

The JOURNAL of GEOGRAPHY

Volume XIII JANUARY 1915 Number 5

ESSENTIALS OF MODERN GEOGRAPHY AND CRITERIA FOR THEIR DETERMINATION.*

By George J. Miller
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Modern Geography

DURING the past ten years geography has been undergoing a rapid evolution. In the early days it was definitely a study of places—naming, locating, bounding, et cetera. This resulted in a rather dry and uninteresting subject and in justifiable condemnation. Then came a period of disorganization when certainty ceased to exist. This has been followed by definite reconstruction until today there is practically a universal agreement of what constitutes scientific geography. The European concept, which has found some followers in this country, emphasizes the distribution idea. The American concept retains this idea but adds something far more vital, viz., the idea of life relationship. Hence modern scientific geography may be considered to be a study of the response of life to the natural environment. This retains everything desirable in the older concepts of the subject, but places emphasis upon the cause and effect idea. It makes possible a sharp cleavage between the science of geography and all the other subjects. The fact that geography calls upon other subjects for material does not mean that it consists of scraps of knowledge that are treated more fully in their respective departments. This is no more true of geography than many other sciences. Practically all of them must use geographic material in their discussions, yet the geographer does not claim them as a part of his field of work.

It follows, therefore, that the essentials of the subject and criteria for their determination are found in conformity with this concept. Since geography has become a definite science, with sharp lines of demarcation between it and other sciences, it is our duty to make our work truly geography and not something else.

Essential Phases of the Subject

If we consider the subject as a whole the question naturally arises—What are its essential phases? Reduced to their lowest terms they are Physical Environment and Life Responses. Elementary school geography is of necessity confined to a study of the simplest principles of the subject and their application to regions. Under physical environment the simplest divisions are air, land, water, and planetary relations. These terms are to be interpreted

* Read in opening a geography round table conference of the Minnesota Educational Association, St. Paul, Oct. 23, 1914.

in their broadest sense and only the elementary phase of each is to be considered in the elementary school. Plant, animal, and human life constitute the responses. These are also to be considered in the simpler and broader terms. Human activities are practically the field of study for children. Very slight attention need be given to physiological modifications that may have been brought about by the natural environment. The latter should be used only when such a response is so clear and simple that it can be understood readily. The field of human activities that are direct responses to the environment is so large that there is little need of going into any other branch of the subject, especially when those responses are open to question.

Divisions of the Subject and Their Relation to Elementary School Geography

In selecting material for elementary school work we should have clearly in mind a logical organization of the entire science. This is not only necessary in selecting subject-matter but in the construction of a course of study. The commonly accepted divisions of the entire field of geography are:

1. Physical geography.
2. Phyto-geography.
3. Zoogeography.
4. Anthropo- or human geography.
   Economic, commercial, historical, and political.

No sound geographic study can be carried on without a clear understanding of physical geography. It constitutes the natural environment of all life and is, therefore, fundamental. This does not mean, however, that the abstract subject should be taught in the elementary school. I am convinced that it can be taught in such a way that the life relationships will be constantly realized and understood by the youngest child in our geography course. Among younger children the physical environment will be learned from a study of life, and in the later years the life response may be reasoned from a study of the environment. This is not theoretical only because it is being done today in the better schools.

Phytogeography, zoogeography, economic, commercial, historical, or political geography, as such, have no more place in the elementary school than does physical geography. This means, therefore, that in an elementary course of study all these fields of geography must be blended and the whole field drawn upon to give a clear concept of the influence of physical environment upon life—plant, animal, and human.

Present Teaching vs. Modern Conception of the Science

Does our geography teaching today conform to this definite, and thoroughly scientific concept of the subject? If not, why not? and what can be done to bring that about? Probably the first great reason for non-conformity

is the lack of a true concept of the modern science among the great mass of our teachers. You who are here today represent a minority who are specially interested in the subject. You also represent a very small percentage of the teachers of this state. There is also a lack of a commonly accepted basis for determining what should be included as geography. It is for the purpose of arriving at a working basis that this particular subject was chosen for this round table. We will not have books with this concept dominant until the teaching force know what they want and demand it. Often I am asked: "Why does not some one write a book that really represents the modern science?" The simple reason is that no one would publish it. The book men are careful students of what the teachers want and they try to fulfill that demand. If you were a publisher you would do the same. Many of our teachers want a book that will teach itself, a book that the pupil can read and then recite. When our teachers demand a text conforming fully with the best conception of the science then such books will be supplied. Publishers are loth to issue a book in this particular field, because they realize that the science is fast taking shape and that a book, along the old lines, will be out of date before they can realize a profit commensurable with the cost.

Much of our geography is still place geography. I do not mean to imply that place geography is unimportant. It probably constitutes a very large proportion of the material that the student will use in after life and is, therefore, of vital importance. Far too much of it has been the "naming and locating of places and telling for what noted." This makes it mere memory work and has little to commend it. The study of a great city like Chicago, New York, Minneapolis, etc., from the standpoint of the factors that have caused them to become great cities, is of vital value. This kind of study accomplishes all that was ever gained by the old method of procedure and very much more. There are relatively few places in the world that the average person needs to know to read the papers and magazines intelligently, or that he needs in the average business or professional life. The essentials of the fact side of geography have been excellently summarized by Prof. Whitbeck* as follows:

"Given an unlettered map of the United States, on which the states are outlined, our grammar-school graduate ought to be able to write the names of the states in their proper places. He ought to be able to do as much for the important divisions of South America, Europe, Asia, and Africa.

"He should know the approximate location of the eight or ten best known rivers of the Mississippi system; three or four of the Pacific rivers, and two or three of Canada; the three great river systems of South America, four or five of Africa, a half-dozen of Asia, two or three of the British Isles, of France, of Germany, and of Russia; also the Po and Danube. He should, of course, know the rivers of the region in which he lives.

* R. H. Whitbeck: Journal of Geography, Vol. 4, 1905, pp. 149-154.

"He should know the location of such arms of the ocean as are highways of the world's great commercial movements.

"He should know the location of those islands and groups of islands that are real factors in the world's activities, or have a great historical interest.

"He should know the facts of position, direction of trend, etc., of the half-dozen most important mountain systems or mountain groups of North America; the Andes, Apennines, Pyrenees, Caucasus, Ural, Himalaya, and Altai; the location of a few of the most frequently mentioned peaks, such, as Mt. Blanc and Mt. Everest.

"There are a few capes that are often mentioned, such as Horn, and Good Hope, and their location is worth knowing.

"He ought to know something of the location of the *chief* colonies of Great Britain, France, Germany, Holland, and the United States.

"He ought to know something of the location of some twenty-five of the chief cities of the United States, what those cities stand for in our industrial and commercial life, and the advantages of their situation. There are twenty or thirty foreign cities whose location should be definitely known, and also something of what these cities stand for. In addition to these there are fifty or more other cities at home and abroad whose names ought to be familiar to the pupil. It is sufficient to know in what state or nation these are located."

More recently there has been a tendency to emphasize industrial geography. Obviously this is one of the most important phases of human response to the environment. Not all phases of industry, however, are wholly a response to the environment and such elements must be taken into consideration. The unfortunate outcome of the introduction of this phase of geography has been a study of *processes* of manufacture and the mechanical construction of machinery. If these processes are an outgrowth of the natural environment of an industry then they are suitable for geographic study, otherwise they are not. The details of the process of manufacturing rubber boots cannot be made geography by the wildest stretch of the imagination. If your course is designed for a strictly vocational or technical school then processes are in order. In this case do not call it geography but more properly a "Study of Industries." Another unfortunate phase has been the memorizing of the leading producers—states, nations, etc.—of this or that commodity. Memorizing of these facts has very little value.

Geography and the State Examinations

I am asked frequently, "What can I do when I have to get my pupils ready to pass the state examinations?" "I would like to introduce some real live material into my work but the examinations count for everything in my town." If this condition is really prevalent in this State it is most unfortunate. The preparation of children to pass examinations is the poorest possible ideal in education. It is a ridiculous situation if the children of the Iron

Range must be given the same instruction as the children of this manufacturing city (St. Paul), or those of an agricultural community.

On the other hand State examinations need not be a serious matter. If we have a course of study properly arranged it will allow plenty of latitude for any teacher to meet the demands of his community and the questions based upon it will be broad enough for any part of the State. Such questions should not, under any circumstances, deal with petty details or be confined to "naming and locating places and telling for what noted." These questions should be made out by some one who has the broadest possible view of the subject and of the conditions prevailing in all parts of the State. It is this kind of a course of study that we must insist upon getting—a course of study based upon the fundamentals of the science and not upon unimportant details. You as teachers can do a great deal for the cause by creating a demand for sane and scientific geography.

Aims of Elementary School Geography

What should be the aims in organizing geography work in the elementary school in conformity with the relationship concept? They should be:

1. To give knowledge of geographic facts and principles.
2. To acquire ability to use that knowledge in daily life—the practical side.
3. To develop habits of clear, logical thinking from cause to effect or vice versa.

Time does not permit a discussion of these aims, but they should be kept in mind when we attempt to establish criteria for determining what the subject-matter should be. In passing we ought, at least, to note that much is said about arranging the subject-matter to fit the child, just as though such an arrangement, if properly made, was not at the same time a logical arrangement of the geographical material itself. I do not hold that there is any *one* logical method of arranging material to fit the child. It is obvious, however, that any logical arrangement must of necessity fit the child or otherwise it is not logically arranged. A logical course of study for children in geography, therefore, must at the same time be pedagogical. If it is not, then the pedagogy is illogical, as is frequently the case.

Establishment of Criteria

I fully realize the danger involved in stating definite criteria for determining what should be included as geography, yet such criteria are of far more importance than naming all the things to be eliminated or included. It is essential to have some sort of a "measuring stick" if our subject is to be recognized and to become established as a definite science. In naming the criteria I reserve the right to alter them as the science develops although at the present time I see no reason for stating them differently. They, at least, have the commendable feature of offering a working basis for the

establishment of a better conception of the subject than now prevails, i. e., if the Report of the Committee on Elementary Course Study of the Minnesota Educational Association indicates the prevailing concept.

This report aims to state the minimum that should be required. Obviously the minimum required must be the essentials of the subject. On page 13 under the caption "Plains and Plateaus of Eurasia" it states that the minimum to be learned are the "Plateau of Iran," "Plateau of Tibet," and the "Desert of Gobi." The entire great plains of Eurasia upon which the people live, build their cities, their railroads, their schools, their churches, their art galleries, carry on their agriculture, and most of their commerce, and upon which their whole life is dependent and is intimately associated are not included as of sufficient importance to be known. Is it conceivable that any teacher intimately associated with the subject would ever make any such list of essentials? It is not to be understood that I am condemning this report as a whole. The idea is good but it is unfortunate that one containing such absurdities should be allowed to influence teaching in this State.

Considering modern geography as a study of life response to the natural environment the *criteria for determining whether subject-matter is geographic* may be stated under two heads—Natural Environment and Life Response. These criteria are as follows:

Natural Environment:

1. Is it a part of the natural environment?

2. Does it exert any important influence upon life—plant, animal, and human?

3. Is it essential to an understanding of the causal relationship of life to that environment?

Life Response:

1. Is the plant and animal subject-matter being tested, clearly a response (in whole or in part) to the natural environment?

2. Are the human activities (or physiological conditions) clearly a response to natural environment?

Determining whether material is geographic is only part of our problem because we are primarily interested in elementary school work. Let us make the assumption that we have *an outline of study logically arranged in subject-matter and adapted to each grade, but broad enough to allow adaptation to a particular locality*. Obviously the essentials of such an outline must be known before the suitability of any subject-matter can be judged. It is also apparent that if the following criteria are logical they will be of assistance in organizing such an outline, as well as being useful in guiding the individual teacher in selecting material and placing emphasis. The *criteria for determining whether certain subject-matter should be included in grade eography* may be stated as follows:

Natural Environment:

1. Is this particular element of the environment essential to an understanding of other elements of the environment and responses, in the succeeding parts of the course?

2. Is this particular element of vital importance for the child to know in after life, even though it is not provided for in the course of study?

Life Response:

1. Is this particular subject matter concerning plant and animal life clearly a response to the natural environment and within the comprehension of the child?

2. Are the human responses, especially human activities, clearly responses to the natural environment and within the comprehension of the child?

3. Are these life responses clearly essential for a child to know in daily life even though not provided for in the course of study?

If the subject-matter which is being tested meets these requirements then it is clearly suitable to consider in the science of geography. I realize fully that much material now taught as geography will not be included. For example, it has been an age-long habit to treat forms of government (names of officers, monarchies, et cetera) as geography. Obviously such things belong in civics or history and not in geography. The plea that they are desirable or essential to know, and that the civics and history provides no place for them is the poorest possible excuse for pushing them into geography. If man's activities have created a form of government that is a response to his environment then that phase of government is a suitable subject for geography. There are many such cases in the world, but that phase of the subject is discussed rarely in our geography classes. Our own state offers many examples of government response to its natural environment, such as its laws governing forests, mining, water power, grading of wheat, etc., etc. But the fact that we have a governor, that the state is divided into counties with a county seat in each, that we have a particular sort of legislature, etc., are not responses to geographic environment (or at least remotely so) and are, therefore, no part of geography. Even the names of literary masters and famous artists are included in some courses of geography.

If we can agree upon this concept of the subject and upon the criteria for determining its content, we should do everything possible to encourage better teaching of this important science.

The Division of School Libraries of the University of the State of New York has published a well-selected *Commercial Subjects Section* of the Annotated Book List for Secondary School Libraries (Albany, 1914, 16 pages), with many geographical titles.

CURRENT GEOGRAPHICAL NOTES.

Industries of Nice and the Riviera

The most important commercial and industrial undertaking in the Department of the Maritime Alps is the perfume industry. The trade in essential oils, concretes, enfleuraged greases, and other primary articles of perfume is centered around Grasse, where there are 60 factories and where over 2,500 persons are employed—this does not include the horticulturists, who cultivate flowers for the factories. Last year witnessed no noticeable advancement in the industry, nor were any new methods introduced. The value of the perfume and primary articles manufactured in 1913 was about $6,500,000, but the competition of the synthetical product has reduced the profits of natural perfume.

The crops of violets, jasmines, and orange flowers were abundant, while roses were scarce, but the average market value of the essences produced from these flowers has remained practically the same, with the exception of the oil of geranium, which sold at $6 or $7 a pound—this essence sold for $2.50 a pound in 1910, and from present indications it will fall below $4 in 1914. American perfumers bought large supplies of essential oils before the new tariff act went into effect.

The floral industry is carried on by horticulturists the year round. In the spring and summer months they furnish flowers for the perfume factories at Grasse, and in the winter they ship the blossoms to the northern cities. This industry within the past few years has developed to such an extent that during the winter season two special flower trains daily connect the Riviera with the large cities of the north. The estimated value of the flowers raised on the Riviera in 1913 was $12,000,000. Those destined for distant points are packed in willow baskets weighing 6 to 12 pounds each, and then sent by parcel post. About 2,200,000 baskets were shipped in 1913.

According to the latest available statistics (1910), there were over 700 gardens, employing over 20,000 hands, and using an area of 20,000 acres. Within the last three years this acreage has considerably increased.

The amounts of the various flowers used in 1913 by the perfume factories at Grasse were 4,000 tons of violets, 800 tons of mimosa, 15,000 tons of roses and orange flowers, 12,000 tons of jasmines, 3,000 tons of tube roses, 1,000 tons of acacias, 1,500 tons of carnations, 600 tons of mignonette, and 500 tons of jonquils, including other flowers in small quantities, making an estimated total of at least 45,000 tons used annually in the perfume industry.—[*Daily Consular and Trade Reports.*]

[illegible] Trade in a Belgian Port

Before [illegible] exported more German products than Hamburg [illegible].—[Iván Assadourian in *La Geographie*, April, 1913.]

The New York Barge Canal

The enlargement of the old Erie Canal has now been under way for more than ten years, and it is expected that the Barge Canal will be opened to traffic sometime during 1915.

The dimensions chosen include locks 45 by 328 feet capacity, and the standard barge to pass through the canal will be of 2,000 tons capacity, carrying 100,000 bushels of wheat—exactly 100 times the capacity of the barges used on the original Erie Canal. The Engineer's Office has even considered plans for a barge of 3,000 tons capacity, but it is yet somewhat uncertain whether the full dimensions will be profitably utilized by so large a craft. The depth of the canal over lock sills is 12 feet; the minimum bottom width in earth section is 75 feet; surface width 123 feet. In rock section the bottom width is 94 feet and in river section 200 feet.

It is over 6 times longer than the Panama Canal. The eastern terminus is at the Government dam and lock at Troy, now under construction, and replacing the old State dam at that point. The pool created by this dam receives the flow from both the upper Hudson and the Mohawk Rivers, which together drain the southern slope of the Adirondacks. The Mohawk River flows over the fall line at Cohoes just before it enters the Hudson, and from these falls, the largest in the state, a great water power is developed for the industries of the surrounding district.

Tide level exists in the Hudson River as far as the Government dam at Troy. The Federal Government is now at work on a channel improvement project from Troy, passing by Albany and running as far as Hudson—about 40 miles altogether—in which the channel is to be deepened to 12 feet, standardizing with the Barge Canal. Below Hudson as far as the port of New York the river has sufficient natural depth and width for all commercial requirements.

In order to reach the river bed above the Cohoes Falls, the Barge Canal ascends by a series of five great concrete locks, rising from 15 feet, the level of the dam breast at Troy, to 184 feet. The Barge Canal ascends from the Crescent level of 184 feet, by eight movable dams, to the Utica level of 404 feet.

Passing through the town of Little Falls, the most expensive work on the Barge Canal system was undertaken. At this point the river flows through a narrow rocky gorge, and the new channel had to be blasted from the solid rock and the ascent around the falls made by a single great concrete lock, with the highe[illegible]le lift of any canal lock in the world, 40 feet 6 inches—considerably [illegible]an that of any single lock on the Panama Canal. From [illegible]ranch connects with Oswego on Lake Ontario, descend-[illegible]to the lake level of 244 feet.

[illegible]oper is left to one side by the new Barge Canal, [illegible]n into that city. West of Syracuse the central

lake system, including especially Seneca and Cayuga Lakes, is to be connected with the Barge Canal.

From the Seneca and Cayuga level all the way to Lake Erie, with very few exceptions, the Barge Canal follows the line of the old Erie Canal. The greatest engineering work of this western section is at Lockport where the Canal ascends from the Ontario to the Erie level over the so-called Niagara escarpment. The original Erie Canal made this climb at Lockport by a double flight of five locks cut in the solid rock, or ten locks altogether. For the new Barge Canal one side of this double flight is left intact for the passage of small craft in local service, while the second flight has been entirely removed and replaced by a new flight of two locks of the modern dimensions for the passage of the standard barges.

The second section of the system connects the Hudson River above Troy with Lake Champlain, and from the lower or northern end of Lake Champlain the traffic descends by the Richelieu River to tide water in the St. Lawrence in Canada, at a point midway between Montreal and Quebec.

Terminal Facilities.

In connection with this great canal system, the State is also constructing public canal terminals at numerous trade centers for handling the canal traffic. Such terminals especially will be located at Tonawanda on the Erie level, and at Rochester, Syracuse, Oswego, Rome, Utica, Schenectady, Troy and Albany and in New York City. The total cost of the Barge Canal System will approximate $120,000,000, and that of the terminals $20,000,000. Under the constitution and laws in the State of New York, the Canal System and all its terminals are unconditionally free to the public without tolls or terminal charges.

A few figures on the New York Barge Canal are appended:

Main line or Erie Branch, 323 miles. 35 locks.

Oneida Lake, additional 19 miles.

Syracuse and Rochester spurs, 10 miles.

Champlain Branch, 61 miles. 11 locks.

Oswego Branch, 23 miles. 7 locks.

Cayuga and Seneca Branch, 27 miles. 4 locks.

Cayuga and Seneca Lakes, 65 miles.

New dams, 28.

Old dams with new crests, 6.

Old dams used without change, 5.

Bridges, 199.

Maximum barge capacity utilizing full lock width, 3,000 tons.

Ordinary barge capacity built for two to pass in channel and for two traveling tandem to be locked at one lockage, 1500 tons.

Construction work began in April, 1905.—[Abstracted from *Commercial America.*]

SUPPLEMENTARY LIST OF MATERIAL ON GEOGRAPHY

which may be obtained free or at small cost.

By Mary Josephine Booth, Librarian
Eastern Illinois State Normal School, Charleston.

BIBLIOGRAPHY

Commercial and agricultural organizations of the United States, 1913. Miscellaneous ser. 8. Foreign and domestic commerce bur. Wash. Senate doc. 1109. 62nd cong. 3rd sess. or, Sup't of doc. Wash. 15c.

Commercial organizations in southern and western cities by G. W. Doonan. 1914. Special agents ser. 79. Foreign and domestic commerce bur. Wash. or, Sup't of doc. Wash. 10c.

These two lists of commercial organizations are useful in obtaining names and addresses of chambers of commerce and commercial clubs. They do not list publications.

Geography, in Frederick K. Noyes, Teaching material in government publications. pp 32-44. 1913. Bull. 1913, no. 47. Bur. of educ. Wash. or, Sup't of doc. Wash. 10c.

Includes physical, political and commercial geography and maps.

PERIODICALS

The earth, monthly. The earth, 1118 Railway exchange, Chic. 25c a year.

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*General Directions. Publications of this description are usually issued in the form of well-illustrated pamphlets and, with little expense, will supplement the books on geography used in the class room. They come from several sources, the United States government, the different state governments, railways, steamship lines, manufacturing firms, and chambers of commerce of cities and towns.

To find where material of this sort may be obtained requires both time and effort. Each month consult the Monthly Catalogue of United States Public Documents, and the Monthly List of State Publications, both published by the Superintendent of Documents, Washington, D. C. Read the advertisements of railways and of steamship companies appearing in magazines and newspapers, which often offer to send descriptive booklets free or for postage. These advertisements change with the seasons and in the course of a year will include almost all parts of the world. In the columns of **Public Libraries, The Library Journal, The Wisconsin Library Bulletin,** and other periodicals are often found items giving the names of recent pamphlets.

Write to your congressman for any desired pamphlets published by the United States government. If he has copies at his disposal, he will send them free, but if not, the Superintendent of Documents, Washington, will supply them for the price stated in this list. The publications of the Pan-American Union may also be obtained free from your congressman. Address the proper department for the state publications, enclosing postage. Write to railways and steamship lines giving the names of the pamphlets desired and enclose postage. If you want to obtain the most recent material, write for a list of publications and choose the ones needed, for new booklets are being frequently issued. Because of the ephemeral nature of many of these publications certain titles given in this list may even now be out of print. Frequently new booklets will be issued to replace them and on this account it is usually better, when writing for a certain title, to add a request for "other similar publications."

REGIONAL GEOGRAPHY

Africa, West

Colonial west Africa (with map). 1912. Elder Dempster & Co. ltd. Colonial house, Liverpool, England or, 6 St. Sacrament st. Montreal, Canada. 1s. Also other publications.

Handbook of information for passengers of the Deutsche Ost-Afrikalinie. 1914. Tourist office, Hamburg-Amer. line, N. Y. or, Ellis, Kislingbury & Co. 4 St. Mary Axe E. C. Lond.

Alabama

Jefferson county and Birmingham Alabama. 1911. Chamber of commerce, Birmingham. Also other publications.

Mobile, Alabama. n. d. Chamber of commerce and business league, Mobile. Also other publications.

Alaska

Alaska fisheries and fur industries in 1913. (annual). 1914. Doc. 797. Bur. of fisheries, Wash.

Alaska, our frontier wonderland. 1914. Alaska bur. Seattle chamber of commerce, Seattle, Wash. 10c.

General information regarding Alaska. 1914. Interior dep't, Wash.

County and city superintendents of schools may be able to obtain several copies of the material in this list and keep it in a convenient place for the use of teachers under their direction.

The first edition of this list was published in the **Wisconsin Library Bulletin** for January-February, 1912. A revised list was published in the **Journal of Geography**, January, 1914, a number of the new titles having been suggested by Miss Adelaide R. Hasse, Chief, Public Documents Department, New York Public Library. It was reprinted by the American Library Association Publishing Board, 78 East Washington Street, Chicago. The new titles in this list are largely pamphlets issued by commercial clubs and chambers of commerce. Certain titles are the same as printed in the **Journal of Geography**, January 1914, but some change has been made in price, frequency of publication, or address.

List of Abbreviations

The usual abbreviations of states and months are used.

agric.—agriculture
Amer.—American
ass'n.—association
ave.—avenue
bldg.—building
Bost.—Boston, Mass.
bull.—bulletin
bur.—bureau
c.—cent, copyright
Chic.—Chicago, Ill.
circ.—circular
cm.—centimeter
co.—company
cong.—congress
d.—penny, pence=2c.
dep't.—department
div.—division
doc.—document
ed.—edition
educ.—education
Lond.—London, England
Minn.—Minneapolis, Minn.
n. d.—no date
no.—number
N. Y.—New York, N. Y.
Phil.—Philadelphia, Pa.
pt.—part
R. R.—railroad, railway
rep't.—report
S. S.—steamship
ser.—series
sess.—session
st.—street
Sup't of doc.—Superintendent of documents
s.—shilling=25c.
univ.—university
v.—volume
Wash.—Washington, D. C.

Railway Routes in Alaska. 1913, 2 parts. 62nd cong. 3d sess. House doc. 1346.

Mineral Resources of Alaska. 1914. Bull. 592. Geological Survey. Wash.

The Earthquakes at Yakutat Bay, Alaska, in September, 1899, by R. S. Tarr and Lawrence Martin. Professional Paper 69, Geological survey, Washington.

Possible agricultural development in Alaska by Levi Chubbuck. 1914. Bull. 50. Div. of publications, Dep't of agric. Wash. or, Sup't of doc. Wash. 10c.

Alaska. 1914. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

(Bibliography)

Alaska territory, list of Public documents for sale by sup't of doc. 1914. Sup't of doc. Wash.

ARGENTINE REPUBLIC

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Argentine Republic; general descriptive data. 1913. Pan Amer. union, Wash.

The Argentine Republic in 1912. 1912. Distributed by Pan Amer. union, Wash.

Commerce of Argentine Republic. (annual). Pan Amer. union, Wash.

General description of Argentine Republic. 1913. Distributed by Pan Amer. union, Wash.

ARIZONA

Arizona, the newest state. n. d. Santa Fe, 1119 Railway exchange, Chic. Also other publications.

Glendale, Arizona. n. d. Board of trade, Glendale.

Phoenix, Arizona, city of progress. 1913. Board of trade, Phoenix. Also other publications.

AUSTRIA

Vienna, the queen city. 1914. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

BOLIVIA

Bolivia: general descriptive data. 1913. Pan Amer. union, Wash.

Commerce of Bolivia. (annual). Pan Amer. union, Wash.

BRAZIL

Brazil, general descriptive data. 1913. Pan Amer. union, Wash.

Brazil in 1912. (annual), by J. C. Oakenfull. Distributed by Pan Amer. union, Wash.

Commerce of Brazil. (annual). Pan Amer. union, Wash.

Economic protection of the India rubber. 1912. Distributed by Pan Amer. union, Wash.

California

California, resources and possibilities. (annual). California development board, San Francisco.

Harbor development of San Francisco. 1913. Berkeley civic bull. v. 2, no. 5. 15 Dec. '13. City club of Berkeley, 1923 Dwight Way, Berkeley.

Pasadena. n. d. Special no. of The Arrowhead, monthly published by Industrial dep't, San Pedro, Los Angeles and Salt Lake R. R. Los Angeles.

Pasadena, California. n. d. Board of trade, Pasadena.

Rep't on Richmond harbor project by Haviland and Tibbetts. 1912. Haviland and Tibbetts. Alaska commercial bldg, San Francisco. Also other publications.

San Diego, California. n. d. Board of supervisors of San Diego county, or Chamber of commerce of San Diego county, San Diego.

Canada

Commerce and industries of Canada and Newfoundland by A. G. Robinson. 1913. Special agents ser. 76. Foreign and domestic bur. Wash. or, Sup't of doc. Wash. 10c.

Guide books. 1913. Geological survey, Ottawa.

No. 1. Eastern Quebec and the maritime provinces. 2 pts.
No. 2. Eastern townships of Quebec and the eastern part of Ontario.
No. 3. Neighborhood of Montreal and Ottawa.
No. 4. Southwestern Ontario.
No. 5. Western peninsula of Ontario and Manitoulin island.
No. 6. Vicinity of Toronto, Muskota and Madoc.
No. 7. Sudbury, Cobalt and Porcupine.
No. 8. Toronto to Victoria and return via Canadian Pacific and Canadian Northern railways. 3 pts.
No. 9. Toronto to Victoria and return via Canadian Pacific, Grand Trunk Pacific and National trans-continental railways.
No. 10. Northern British Columbia and Yukon territory and along the north Pacific coast.

Limited edition. Probably only to be obtained by Canadian schools.

Central America

Latin American foreign trade in 1912. 1914. Pan Amer. union, Wash.

Map showing railroads of Latin America in operation and under construction, 16 by 21 inches. 1913. Pan Amer. union, Wash.

Chile

Chile; an account of its wealth and progress by Julia P. Canto. 1912. Distributed by Pan Amer. union, Wash.

Chile; general descriptive data. 1913. Pan Amer. union, Wash.

Chile, its position, resources, climate, mining, fruit growing and farming by Chile-Foreign office. n. d. Distributed by the Pan Amer. union, Wash.

Commerce of Chile. (annual). Pan Amer. union, Wash.

'Opportunities for foreign trade in Chile by Chile-Foreign office. 1913. Distributed by Pan Amer. union, Wash.

Views of the Chilean nitrate works and ports. n. d. Chilean Nitrate Propaganda, 25 Madison ave. N. Y.

China

Some roads towards peace by Charles W. Eliot. 1914. Carnegie endowment for international peace, 2 Jackson place, Wash.

Colombia

Colombia; general descriptive data. 1913. Pan Amer. union, Wash.

Commerce of Colombia. (annual). Pan Amer. union, Wash.

Colorado

Denver today; descriptive, statistical, pictorial. 1914. Chamber of commerce, Denver.

Map of Colorado showing all railroads, 56 by 44 cm. n. d. Railroad commission, Denver.

Connecticut

Connecticut, industrial, agricultural, historical, and other facts concerning a progressive state. 1914. State board of trade. Board of trade, Hartford.

Made in Hartford; handbook and reports of the Board of trade. 1912. Board of trade, Hartford.

Costa Rica

Commerce of Costa Rica. (annual). Pan Amer. union, Wash.

Commercial monograph of Costa Rica, no. 1. 1913. Dun's international review. Distributed by Pan Amer. union, Wash.

Costa Rica; general descriptive data. 1913. Pan Amer. union, Wash.

Crater Lake National Park

General information regarding Crater lake national park. (annual). Interior dep't, Wash.

Panoramic view of Crater lake national park by J. H. Renshawe. 1914. Geological survey, Wash. 25c. or, Sup't of doc. Wash. 25c.
16½ by 18 inches; scale 1 mile to the inch.

Cuba

Commerce of Cuba. (annual). Pan Amer. union, Wash.

Cuba; general descriptive data. 1913. Pan Amer. union, Wash.

A few facts and figures in regard to Cuba by Cuba-Dep't of agric. n. d. Distributed by Pan Amer. union, Wash.

Future farming in Cuba by Forbes Lindsay. 1913. Pan Amer. union, Wash.

La Republique de Cuba. n. d. Distributed by Pan Amer. union, Wash.
In French and English.

DELAWARE

Wilmington as a manufacturing center. 1911. Board of trade, Wilmington.

DISTRICT OF COLUMBIA

Guide to the national capital. 1912. Pennsylvania lines, Pittsburgh, Penn.

(The) new Washington by George H. Gall. c1913. Chamber of commerce, Wash.

Washington, old and new by Barry Bulkley. c1913. Distributed by C. F. Schutt, The New Ebbitt, Wash.

Washington the capital. 1913. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

DOMINICAN REPUBLIC

Commerce of the Dominican Republic (annual). Pan Amer. union, Wash.

Development of Dominican Republic by Charles H. Albrecht and Frank A. Henry. 1914. Special consular rep't 65. Foreign and domestic commerce bur. Wash. or, Sup't of doc. Wash. 5c.

Dominican Republic; general descriptive data. 1913. Pan Amer. union, Wash.

ECUADOR

Commerce of Ecuador. (annual). Pan Amer. union, Wash.

Ecuador; general descriptive data. 1913. Pan Amer. union, Wash.

EGYPT

Egypt, the land of mystery. 1913. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

ENGLAND

The garden of England and the home of Dickens. 1912. South Eastern and Chatham R. R. of England, 334 Fifth ave. N. Y.

London. 1913. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

FLORIDA

The everglades and other essays relating to southern Florida by John Gifford. c1912. Everglades sugar and land co. Miami.

Jacksonville. n. d. Distributed by Board of trade, Jacksonville. Also other publications.

Lee county, Florida; the borderland of the tropics. Board of county commissioners, Fort Myers, Florida.

Pictures and pointers about Pensacola. 1911. Commercial ass'n of Pensacola.

Also publishes monthly bull. Greater Pensacola and other publications.

Semi-tropic Florida development year book. 1914. Tampa tribune, Tampa. 25c.

Tampa, for health, wealth and happiness. 1911-12. Board of trade, Tampa.

Wood using industries; the kudzu vine; citrus grove; its location and cultivation; pecan culture in Florida; cane grinding and syrup making. 1913. Dep't of agric. Tallahassee.

France

Pyrenees and Basque coast. French state railways bur. 2 Rector St. N. Y. Also other publications.

Paris, the incomparable. 1913. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

General Grant National Park

General information regarding Sequoia and General Grant national parks. (annual). Interior dep't, Wash.

Georgia

Atlanta. n. d. Chamber of commerce, Atlanta. Also other publications.

Savannah, municipal, financial, commercial, industrial, agricultural, residential, and historical. 1911. Chamber of commerce, Savannah.

Germany

Economic conditions in Germany by J. G. Schmidlapp. 1914. Senate doc. 367. 63rd cong. 2nd sess. or, Sup't of doc. Wash. 5c.

The story of the Rhine. 1914. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

Glacier National Park

General information regarding Glacier national park. (annual). Interior dep't, Wash.

Glaciers of Glacier national park by W. C. Alden. 1914. Interior dep't, Wash. or, Sup't of doc. Wash. 15c.

Origin of scenic features of Glacier national park by Marius R. Campbell. 1914. Interior dep't, Wash. or, Sup't of doc. Wash. 15c.

Panoramic view of Glacer national park, prepared by John H. Renshawe. 1914. Geological survey, Wash. or, Sup't of doc. Wash. 25c.
21 by 23 inches. Scale 3 miles to the inch.

Topographic map of Glacier national park. Geological survey, Wash. 30c.

Glacier national park. 1914. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

Guatemala

Commerce of Guatemala. (annual). Pan Amer. union, Wash.

Guatemala; general descriptive data. 1913. Pan Amer. union, Wash.

Map of Guatemala by Guatemalan central R. R. lines. n. d. Distributed by Pan Amer. union, Wash.

Haiti

Commerce of Haiti. (annual). Pan Amer. union, Wash.

Haiti; general descriptive data. 1913. Pan Amer. union, Wash.

Holland, See Netherlands

Honduras

Commerce of Honduras. (annual). Pan Amer. union, Wash.

Honduras; general descriptive data. 1913. Pan Amer. union, Wash.

IDAHO

Boise, Idaho. n. d. Commercial club, Boise.

Great facts about a great region. n. d. Idaho-Washington development league, Lewiston.

Idaho, the dawn of plenty. 1912. 7th biennial rep't of Bur. of immigration, labor, and statistics, Boise.

The Twin Falls country, southern Idaho. n. d. Commercial club, Twin Falls. Also other publications.

ILLINOIS

Chicago. c1912. Ass'n of commerce, 10 S. La Salle st. Chic. 25c (?). Also other publications.

Geography, history and civics of Woodford county, Ill. Ed. by Roy L. Moore, County sup't of schools. Woodford county teachers' ass'n, Eureka.

Greater Springfield. 1912. Commercial ass'n, Springfield.

Quincy. n. d. Chamber of commerce, Quincy. Also other publications.

Rockford. 1912. Chamber of commerce, Rockford. Also other publications.

INDIANA

Fort Wayne; a presentation of her resources, achievements, and possibilities. 1913. Commercial club, Fort Wayne.

Gary. n. d. Commercial club, Gary. 15c.

Official program and souvenir; encampment Indiana dep't Grand Army of the Republic. 1912. Distributed by Chamber of commerce, South Bend. Contains description and illustrations of the town.

IOWA

Davenport, Iowa; a city in which to live. n. d. Greater Davenport committee. 10c. Also other publications.

IRELAND

Romantic Ireland. 1913. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

ITALY

Venice, the island city. 1913. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

JAPAN

Japan. 1914. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

Japanese characteristics by Charles W. Eliot. 1913. No. 71. Amer. ass'n for international conciliation, 407 W. 117th st. N. Y.

The rural life of Japan, 1910. Bur. for local affairs, home dep't, Tokyo, Japan.

Some roads towards peace by Charles W. Eliot. 1914. Carnegie endowment for international peace, 2 Jackson Place, Wash.

Kansas

Kansas City is a manufacturing city. n. d. Commercial club, Kansas City.

Some of the publications of the Commercial club include material on Kansas City, Missouri, and Kansas City.

Wichita the city of opportunities. n. d. Business ass'n, Wichita. Also other publications.

Louisiana

Louisiana, nature's garden spot. n. d. Industrial and immigration commissioner, Ill. central R. R. Chic. Also other publications.

Map of Louisiana. 1913. Apply Dep't agric. and immigration, Baton Rouge.

A phyto-geographic map showing principal vegetation areas, all principal commercial points, town population and railway distances.

New Orleans, what to see and how to see it. n. d. Ass'n of commerce, New Orleans.

The wet lands of southern Louisiana and their drainage by Charles W. Okey. Dep't bull. 71, Agric. dep't, Wash. or, Sup't of doc. Wash. 15c.

Maine

Tourists' hand book of Portland, Maine. c1912. Board of trade, Portland.

Manitoba

Manitoba a forest province by R. H. Campbell. 1913. Circ. 7. Forestry branch, Ottawa, Can.

Nibigami (country of lakes). n. d. Grand trunk Pacific, Montreal, Canada.

Maryland

The Baltimore book. c1914. Address Mr. Wilbur F. Coyle, City library, City hall, Baltimore.

Massachusetts

Boston, a guide book. 1912. Chamber of commerce, Bost. 10c.

Boston as a manufacturing center. n. d. Publicity and information bur., Bost. Also publishes a large map of Boston.

Progressive Springfield. c1914. George S. Graves, 21 Besse place, Springfield. 10c. Also other publications.

Mesa Verde National Park

Antiquities of the Mesa Verde national park; cliff palace by J. W. Fewkes. Bull. 51. 1911. Bur. of Amer. ethnology, Wash. or, House doc. 991. 61st cong. 2nd sess. or, Sup't of doc. Wash. 45c.

Antiquities of the Mesa Verde national park; spruce tree house by J. W. Fewkes. 1909. Bull. 41. Bur. of Amer. ethnology, Wash. or, Sup't of doc. Wash. 40c.

General information regarding Mesa Verde national park. (annual). Interior dep't, Wash.

Mexico

Commerce of Mexico. (annual). Pan Amer. union, Wash.

Mexico; general descriptive data. Special ed. 1914. Pan Amer. union, Wash.

New commercial atlas map of Mexico published by Rand, McNally Co. Chic. 1914. Distributed by Pan Amer. union, Wash.

Mexico. 1914. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

Michigan

Alpena, Michigan; a city and county of opportunities. n. d. Chamber of commerce, Alpena. Also other publications.

Detroit, a city of today. n. d. Convention and tourists' bur. Detroit.

Detroit. 1913. Board of commerce, Detroit. Also other publications.

Facts about Battle Creek, Michigan. n. d. Post land co. Battle Creek.

Facts about Michigan. 1913. Boyne City, Gaylord and Alpena R. R. Boyne City.

Grand Rapids, beautiful, industrial, commercial. n. d. Board of trade, Grand Rapids. Also other publications.

Grand Traverse region. n. d. Committee of 21, Traverse City.

Greater Saginaw. 1912. Saginaw daily news. Distributed by Board of trade, Saginaw.

The lure of Kalamazoo. 1912. Commercial club, Kalamazoo.

Michigan, agricultural, horticultural, and industrial advantages. Bull. 3. 1914. Immigration commission, Lansing.

Michigan agriculture; its present status and wonderful possibilities by R. S. Shaw. 1914. Special bull. 70. Michigan agric. experiment station, East Lansing.

Western Michigan. n. d. Western Michigan development bur. Traverse City. Also other publications.

Where to go and what about Sault Ste Marie. n. d. Soo business men's ass'n, Sault Ste Marie. Also other publications.

Minnesota

Duluth. 1913. Commercial club, Duluth. Also other publications.

Map of Minnesota. 1914. State auditor, St. Paul. Also other publications. Contains descriptive material on back.

Minneapolis, the city of lakes and gardens. n. d. Civic and commerce ass'n, Minn. Also other publications.

Saint Paul, the gateway to the great northwest. n. d. Ass'n of commerce, St. Paul. Also other publications.

Mississippi

Jackson, Mississippi. 1913. Board of trade, Jackson. Also other publications.

Mississippi, a wonderful agricultural state. n. d. Industrial and immigration commissioner, Ill. Central R. R. Chic. Also other publications.

Share Mississippi's opportunities. 1913. Dep't of agric. Jackson.

Missouri

Between trains in Kansas City. n. d. Commercial club of Kansas City. Also other publications.

Some of the publications of the commercial club include material on Kansas City, Missouri, and Kansas City, Kansas.

Industrial information, labor resources, advantages, opportunities. 1912. Bur. of labor statistics, Jefferson City. Also other publications.

Jefferson City, Missouri. n. d. Distributed by Commercial club, Jefferson City. Also other publications.

Joplin, Missouri. 1913. Commercial club, Joplin. Also other publications.

Municipal institutions of St. Louis, when to go and what to see. 1914. City plan commission, St. Louis.

St. Joseph. n. d. Commerce club, St. Joseph. Also other publications.

Special Saint Louis number. Agents' bull. v. 6, no. 9, Nov. 1913. Missouri Pacific Iron Mountain R. R. St. Louis.

Trade and commerce of St. Louis (latest rep't). Merchants' exchange, St. Louis.

Gives description of industries and statistics.

Vacation days in St. Louis. n. d. Business men's league, St. Louis. Also other publications.

Montana

Great Falls leader; development edition. v. 26, no. 25. 1913. Leader co. Great Falls. 25c.

The resources and opportunities of Montana. 1914. Dep't of agric. and publicity, Helena.

Western Montana. 1913. Distributed by Chamber of Commerce, Missoula.

Mount Rainier National Park

General information regarding Mount Rainier national park. (annual). Interior dep't, Wash.

Mount Rainier and its glaciers by F. E. Matthes. 1914. Interior dep't, Wash. or, Sup't of doc. Wash. 15c.

The mountain of the great snow. n. d. Chic. Milwaukee and St. Paul R. R. (Puget Sound lines), Seattle, Wash.

Nebraska

Beautiful Lincoln, Nebraska's capital city. n. d. Commercial club, Lincoln. Also other publications.

Omaha, the best city of its size in the United States. n. d. Commercial club, Omaha. Also other publications.

Resources of Nebraska. 1913. Bull. 27. State bur. of labor and industrial statistics, Lincoln.

Netherlands

Through Holland. n. d. Netherlands state R. R. and Flushing royal mail route, 334 Fifth Ave. N. Y. Also other publications.

Holland. 1914. Mentor ass'n, inc. Fourth ave. at 19th st. N. Y. 15c.

NEW ENGLAND

Scenic and historic trips from Boston. Boston and Maine R. R. Bost.

NEW HAMPSHIRE

City of Manchester. c1912. Chamber of commerce, Manchester.

Concord, the capital of New Hampshire. 1909. Commercial club, Concord.

NEW JERSEY

Along the shore and in the foothills. n. d. New Jersey central, Newark. 4c. Also other publications.

Industrial exposition. 1913. Board of trade, Elizabeth.

Newark in the public schools of Newark. 1911. Board of education, Newark. Course of study on Newark.

Elizabeth, New Jersey. n. d. Board of trade, Elizabeth.

NEW MEXICO

Albuquerque, New Mexico. 1912. Commerce club, Albuquerque.

Old-new Santa Fe and round about. n. d. Santa Fe, Topeka, Kan.

Santa Fe, New Mexico; nature's leading sanitarium. n. d. Chamber of commerce, Santa Fe. Also other publications, including a map of Santa Fe.

NEW YORK

Above the clouds and old New York by H. Addington Bruce. c1913. F. W. Woolworth Co., Woolworth bldg, N. Y.
Printed for distribution to visitors, but sometimes sent by mail.

The heart of the empire state. c1913. Distributed by Chamber of commerce, Utica. Also other publications.

The Hudson river. n. d. New York central lines, N. Y.

Oswego, the industrial and commercial city. 1913. Oswego daily times, Oswego.

Preservation of Niagara falls. 1911. Doc. 246, 62nd cong. 2nd sess. or, Sup't of doc. Wash. 20c.

Yearbook (latest). Chamber of commerce, Syracuse. Contains statistics of city.

The wonders of Niagara. n. d. Shredded wheat co. Niagara Falls. 10c.

NEW ZEALAND

Information relative to the port of Wellington, N. Z. Yearbook 1913-14. Wellington harbour board, Wellington.

New Zealand. Dep't of tourist and health resorts. Wellington.

NEWFOUNDLAND

Commerce and industries of Canada and Newfoundland by A. G. Robinson. 1913. Special agents' ser. 76. Foreign and domestic commerce bur. Wash. or, Sup't of doc. Wash. 10c.

NICARAGUA

Commerce of Nicaragua. (annual). Pan Amer. union, Wash.

Nicaragua; general descriptive data. 1913. Pan Amer. union, Wash.

North Carolina

Asheville, America's beauty spot. n. d. Board of trade, Asheville.

Charlotte, North Carolina. 1913. Greater Charlotte club, Charlotte.

Cotton culture in North Carolina. 1912. Dep't of agric. Raleigh.

A day in Raleigh. n. d. Chamber of commerce, Raleigh. Also other publications.

Winston-Salem, city of industry. 1914. Board of trade. Winston-Salem. Also other publications.

North Dakota

Bismarck and Burleigh county. n. d. Distributed by Commercial club, Bismarck. Also other publications.

Facts about Grand Forks. n. d. Commercial club, Grand Forks. Also other publications.

Fargo, the gateway to North Dakota. n. d. Commercial club, Fargo.

Physiography of the Devils-Stump lake region, N. D. by Howard E. Simpson in State geological survey. Biennial rep't, v. 6, 1912. State geological survey, Bismarck.

The Northwest

Along the scenic highways. n. d. Northern Pacific R. R. St. Paul, Minn. Also other publications.

Norway

Norway, nature's wonderland. n. d. Norwegian American line, 8-10 Bridge st. N. Y. Also other publications.

Ohio

Akron, the city of opportunity. n. d. Chamber of commerce, Akron.

Cincinnati,—an old city made new. c1913. Chamber of commerce, Cincinnati. Also other publications.

Columbus, Ohio. n. d. Board of trade, Columbus.

Toledo for transportation. 1913. Commerce club, Toledo.

Oklahoma

Agricultural resources of eastern Oklahoma. n. d. Eastern Oklahoma agric. ass'n, Barnes bldg, Muskogee.

Greater Muskogee. 1914. Commercial club, Muskogee. Also other publications. This is a monthly magazine but numbers are sent on request.

Guthrie, the manufacturing center of Oklahoma. n. d. Chamber of commerce, Guthrie.

The resources of Oklahoma in a pocket book by C. W. Shannon. 1912. Geological survey, Norman.

Tulsa; annual statement compiled by the auditing dep't. 1912-13. City auditor, Tulsa. Gives material on commercial and industrial Tulsa.

ONTARIO

Hamilton, Canada; its history, commerce, industries, resources. 1913. City council, Hamilton; apply to Mr. H. M. Marsh, Commissioner of industries, Hamilton.

Toronto, a city of opportunities. 1912. Toronto harbor commissioners, Toronto.

OREGON

The economic geological resources of Oregon. 1912. State bur. of mines, Corvallis.

The mineral resources of Oregon, monthly. Oregon bur. of mines and geology, Corvallis.

PANAMA

Commerce of Panama. (annual). Pan Amer. union, Wash.

Panama; general descriptive data. 1913. Pan Amer. union, Wash.

PARAGUAY

Commerce of Paraguay. (annual). Pan Amer. union, Wash.

Paraguay; general descriptive data. 1913. Pan Amer. union, Wash.

PENNSYLVANIA

Birds eye view map of Philadelphia. Merchants and manufacturers ass'n, N. E. cor. 13th and Market sts. Phil.

Consider Harrisburg, the heart of distribution. n. d. Chamber of commerce, Harrisburg.

See Pittsburgh first. 1914. Chamber of commerce, Pittsburgh. Also other publications.

Where business centers. 1913. Pittsburgh industrial development commission, Pittsburgh. Also other publications.

PERU

Commerce of Peru. (annual). Pan Amer. union, Wash.

Peru; general descriptive data. 1913. Pan Amer. union, Wash.

PHILIPPINE ISLANDS

Lumbering industry of Philippines by John R. Arnold. 1914. Special agents ser. 88. Foreign and domestic commerce bur. Wash. or, Sup't of doc. Wash. 5c.

Philippine cocoanut industry by O. W. Barrett. 1913. Bur. of agric. Manila.

RUSSIA

Russia, a handbook on commercial and industrial conditions by John H. Snodgrass and others. 1913. Special consular reports 61. Bur. of foreign and domestic commerce, Wash. or, Sup't of doc. Wash. 50c.

SAHARA

The great Sahara, a hot desert, by Marion Weller. 1912. v. 9, no. 4. Bull. Northern Ill. state normal school, DeKalb, Ill.

Salvador

Commerce of Salvador. (annual). Pan Amer. union, Wash.

Salvador; general descriptive data. 1913. Pan Amer. union, Wash.

Scotland

Scotland, the land of song and scenery. 1913. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

Sequoia National Park

General information regarding Sequoia and General Grant national parks. (annual). Interior dep't, Wash.

South America

Commercial traveler in South America. 1914. Pan Amer. union, Wash.

Latin American foreign trade in 1912. 1914. Pan Amer. union, Wash.

Map showing railroads of Latin America in operation and under construction. 1913. Pan Amer. union, Wash.
Size, 16 by 21 inches.

South America as an export field by Otto Wilson. 1914. Special agents ser. 81. Bur. of foreign and domestic commerce, Wash. or, Sup't of doc. Wash. 25c.
Gives a brief description of the industrial and commercial geography of the different countries of South Amer.

South American meat industry by A. D. Melvin. 1914 (from U. S. Agric. dep't Yearbook, 1913) separate 629. Div. of publications, Dep't of agric. Wash. or, Sup't of doc. Wash. 5c.

World race for rich South American trade by C. L. Chandler. 1913. Senate doc. 208, 63rd cong. 1st sess. or, Sup't of doc. Wash. 5c.

(Bibliography)

Publications on South America, brief review of information available to manufacturers and exporters in bulletins issued by the Bur. of foreign and domestic commerce. 1913. Miscellaneous ser. 12. Foreign and domestic commerce bur., Wash. or, Sup't of doc. Wash. 5c.

South Carolina

Charleston, South Carolina. n. d. Chamber of commerce, Charleston.

South Dakota

Mitchell, the corn palace of the world. n. d. Commercial club, Mitchell.

Sioux Falls. n. d. Commercial club, Sioux Falls.

Spain

Trips through Spain. French state railways bur. 2 Rector st. N. Y.

Spain and Gibralter. 1913. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

Switzerland

Switzerland, the land of scenic splendors. 1913. Mentor ass'n inc. Fourth ave. at 19th st. N. Y. 15c.

Tennessee

Chattanooga. n. d. Chamber of commerce, Chattanooga. Also other publications.

Knoxville, the exposition city. 1913. Distributed by Board of commerce, Knoxville. Also other publications.

Map of Tennessee. 1913. Dep't of agric. and bur. of immigration, Nashville. Agricultural resources, counties, railways, post offices, public highways, rivers, soil formation, location of coal, phosphate, copper, and other minerals.

Memphis district. n. d. Business men's club, Memphis. Also other publications.

Plant an industry in Nashville, Tennessee and watch it grow. n. d. Industrial bur. Nashville. Also other publications.

Texas

Beaumont, a gateway to the marts of the world. 1910. Chamber of commerce, Beaumont. Also other publications.

Coming south? n. d. Chamber of commerce, Austin. Also publishes Austin progress, monthly.

Dallas, the city of the hour. n. d. Chamber of commerce, Dallas. Also other publications.

East-Southeast Texas. Texas and New Orleans R. R. Houston.

El Paso, what it is and why. c1914. Chamber of commerce, El Paso.

Galveston. n. d. Missouri, Kansas and Texas lines, St. Louis, Mo.

Houston. n. d. Chamber of commerce, Houston.

Where to go in Galveston. n. d. Commercial ass'n, Galveston. Also other publications.

San Antonio under sunny southern skies. n. d. St. Anthony hotel, San Antonio. 15c.

United States

Supplements to the Abstract of the thirteenth census of the United States, 1910. 1914. Census bur. Wash. These supplements give the statistics of each of the 48 states, and for the District of Columbia.

Uruguay

Commerce of Uruguay. (annual). Pan Amer. union, Wash.

Uruguay; general descriptive data. 1913. Pan Amer. union, Wash.

Utah

Logan city by G. Merle Taylor. 1911. Commercial boosters' club, Logan. Also other publications.

Ogden canyon. n. d. Publicity bur. Ogden. Also other publications.

Resources of the state of Utah. 1911. Union Pacific R. R. Omaha, Neb. Also other publications.

Venezuela

Commerce of Venezuela. (annual). Pan Amer. union, Wash.

Venezuela; general descriptive data. 1913. Pan Amer. union, Wash.

Vermont

Burlington on Lake Champlain. n. d. Merchants' ass'n, Burlington.

Vermont, the land of Green Mountains. Bur. of publicity, office of Sec'y of state, Essex Junction. Also other publications.

Victoria

Victorian year book (latest ed.) Government statist, Melbourne.

Virginia

The beautiful caverns of Luray. Luray caverns corporation, Luray.

Norfolk, Virginia. 1914. Industrial commission, Norfolk. Also other publications.

Richmond, Virginia, yesterday and to-day. 1914. Chamber of commerce Richmond.

Washington

Annual rep't (latest) Port of Seattle commission, Seattle.

Centralia, the hub city of southwestern Washington. n. d. Commercial club, Centralia. Also other publications.

Homeseekers' guide to the state of Washington by Harry F. Giles. 1914. Bur. of statistics and immigration, Olympia. Also other publications.

Olympia, a capital capital, industries, resources, attractions. n. d. Chamber of commerce, Olympia. Also other publications.

Seattle, manufactures and commerce. n. d. Oregon-Washington R. R. and navigation co., Seattle. Also other publications.

Seattle, Washington. n. d. Exploitation and industrial bur. New chamber of commerce, Seattle. Also other publications.

Walla Walla valley, Washington. n. d. Commercial club, Walla Walla.

Yakima valley, Washington. n. d. Yakima commercial club, North Yakima.

West Virginia

Illustrated and descriptive Charleston, West Virginia. n. d. Distributed by Chamber of commerce, Charleston. Also other publications.

The real Wheeling. 1913. Board of trade, Wheeling. Also other publications.

Wisconsin

Annual rep't (latest). Chamber of commerce, Milwaukee. 25c. Gives statistics of trade and commerce.

Annual rep't of the city statistician of Superior, Wisconsin. 1912. City statistician, Superior.

The climate of Wisconsin and its relation to agriculture by A. R. Whitson and O. E. Baker. 1912. Bull. 223. Agric. experiment station, Madison.

Commercial Milwaukee. 1914. Merchants and manufacturers ass'n, Milwaukee.

Geography and industries of Wisconsin by R. H. Whitbeck. 1913. Geological and natural history survey, Madison. For list of other bulletins soil maps, etc., write State Geologist, Madison, Wis.

Greater Racine. 1911. Distributed by Commercial club, Racine.

North Wisconsin farm edition of the Superior telegram. Distributed by Commercal club, Superor. Also other publications.

Opportunities for profitable farming in northern Wisconsin by E. J. Delwiche. 1913. Bull. 196. Agric. experiment station, Madison.

Wisconsin opportunities. Commissioner of immigration, Madison. Also other publications.

The Wisconsin Number, Journal of Geography, April, 1914. Articles on physical geography, climate, lumbering, agriculture,. dairying, minerals, manufacturing, ports, etc. Business Manager, Journal of Geography, Madison, Wis. 10c.

Wyoming

The Cheyenne of today. n. d. Industrial club, Cheyenne.

Yellowstone National Park

Fossil forests of the Yellowstone national park by F. H. Knowlton. 1914. Interior dep't, Wash. or, Sup't of doc. Wash. 10c.

General information regarding Yellowstone national park. (annual). Interior dep't, Wash.

Map of Yellowstone national park. Sup't of doc. Wash. 40c. 28½ by 32 inches; scale 2 miles to the inch.

Through wonderland. Northern Pacific R. R., St. Paul, Minn. 6c. Also other publications.

Yellowstone national park. c1913. Northern Pacific R. R., St. Paul, Minn. Also other publications.

Yosemite National Park

General information regarding Yosemite national park. (annual). Interior dep't, Wash.

Panoramic view of Yosemite national park prepared by J. H. Renshaw. 1914. Geological survey, Wash., 25c, or Sup't of doc. Wash. 25c.
18½ by 18 inches; scale 3 miles to the inch. Other maps may be obtained from Sup't of doc, Wash. one 28½ by 27 inches; scale 2 miles to the inch. 50c; another 35 by 15½ inches; scale 2000 feet to the inch. 20c.

INDUSTRIES AND COMMERCIAL PRODUCTS.

Asphalt

Trinidad and Bermudez asphalts and their use in highway construction by Clifford Richardson, reprinted from Popular science monthly, July-August, 1912. Distributed by Barber asphalt paving co. Phil. Also other publications.

Binder Twine

Binder twine industry. c1912. International harvester co. of New Jersey. Agric. extension dep't, Harvester bldg, Chic. 20c. Also other publications.

Books

The story of the making of a book. c1914. Charles Scribner's sons, N. Y.

Bread

Story of bread. 1911. International harvester co. of New Jersey, inc. Agric. extension dep't, Harvester bldg, Chic. 3c.

Carborundum

The man who didn't know when he had failed, by F. W. Haskell. c1911. Carborundum co. Niagara Falls, N. Y. Also other publications.

Cement and Concrete

Concrete pavements, sidewalks, curb, and gutter. c1913. Universal Portland cement co. 208 La Salle st. Chic. Also other publications.

To schools offering courses in agriculture a set of published lectures is supplied; charts and sets of lantern slides, illustrating the lectures, are loaned.

China

Book on china. Onondaga pottery co. Syracuse, N. Y.

Coal Mining

Coal mining practice in Danville, Ill. by S. O. Andros. 1914. Bull. 2 of Ill. coal mining investigation, Urbana, Ill. Also other publications.

Copper

Copper smelting industries of Canada by A. W. G. Wilson. 1913. Mines branch, Ottawa, Canada.

Cork

Cork; being the story of the origin of cork, the processes employed in its manufacture, its various uses in the world today. 1909. Armstrong cork co. Pittsburgh, Penn.

Cotton Manufacture

City of Manchester, N. H. and the Amoskeag manufacturing company. c1912. Chamber of commerce, Manchester, N. H.
Contains pictures of cotton and woolen manufacturing.

Fishing

Preparation of the cod and other salt fish for the market, by A. W. Bitting. 1911. Bull. 133. Bur. of chemistry, Wash. or, Sup't of doc. Wash. 15c.

Flavoring Extracts

Vanilla and other flavoring extracts. n. d. Joseph Burnett co. 36 India st. Bost.

Flour

The miller's almanac. (annual). The northwestern miller, Minn. 50c.
Largely statistics.

The wheat and flour primer. c1910. Washburn-Crosby co. Minn.

Harvest and Harvesting

Harvest scenes of the world. 1913. International harvester co. of New Jersey, inc. Agric. extension dep't, Harvester bldg. Chic. 50c.

Hemp

Hemp by Lyster H. Dewey. 1914. (from Dep't of agric. Yearbook 1913). Yearbook separate 628. Div. of publications, Dep't of agric. Wash. or, Sup't of doc. Wash. 15c.

Jute

Linen, jute and hemp industries in the United Kingdom by W. A. G. Clark. 1913. Special agents ser. 74, Bur. of foreign and domestic commerce, Wash. or, Sup't of doc. Wash. 25c.

Limestone

Indiana limestone. n. d. Indiana limestone quarrymen's ass'n, Bedford, Ind.
Will soon have for a loan a cinematographic film showing each and every stage in the process of preparing Indiana limestone ready to set in the building.

Linen

Linen, jute and hemp industries in the United Kingdom by W. A. G. Clark. 1913. Special agents ser. 74. Bur. of foreign and domestic commerce, Wash. or, Sup't of doc. Wash. 25c.

Lumber Industry

Annual report, 1911. National lumber manufacturers' ass'n, 1621. Otis bldg, Chic.

The pine cone, exposition number, May, 1914. The pine cone, 1014 Germania life bldg, St. Paul, Minn.

Timber land bonds analyzed as investments. c1913. Clark L. Poole and co. Chic.

Not intended for general distribution; libraries may possibly obtain copies.

Timber underwritings. n. d. Howard Simmons and co., First national bank bldg. Chic.

NEWSPAPERS

The making of a great newspaper. n. d. N. Y. world, N. Y.

PENCILS

Pencil geography. c1904. Joseph Dixon crucible co. Jersey City, N. J.

PLATE GLASS

The making of plate glass. n. d. Pittsburgh plate glass co. Pittsburgh, Penn.

POTASH INDUSTRY

Potash industry. n. d. German Kali works, inc. McCormick bldg, Chic. Also other publications.

RICE

Rice and rice cookery by Miriam Birdseye. Cornell reading course, Jan. 1, 1914. Reprinted and distributed by The rice millers ass'n, room 209, Kyle bldg, Beaumont, Texas. Also other publications.

RUBBER

Rubber from forest to foot. c1913. United States rubber co. Broadway at 58th st, N. Y. Also other publications.

SALMON

Salmon data. 1913. Salmon canners ass'n, Seattle, Washington.

SALT

The Worcester salt news, June, 1912. Worcester salt co. 71-73 Murray st. N. Y. Illustrated descriptions of salt manufacture.

SHEARS

Pointed sharpness. n. d. J. Wiss and sons co. Newark, N. J.

SHIP BUILDING

Aquitania, the making of a mammoth liner by E. K. Chatterton. n. d. Cunard steamship co. ltd, 21-24 State st. N. Y.

SHOES

A short history of American shoemaking by Fred A. Gannon. c1912. Distributed by Sec'y, New England shoe and leather ass'n, 166 Essex st, Bost. Mass. Also other publications.

SILK

The silk industry, from the worm to the wearer. n. d. M. Heminway and sons silk co. 890 Broadway, N. Y.

Silk, its origin, culture and manufacture. 1911. Corticelli silk mills, Florence, Mass. paper 10c. cloth 24c.

Soap

The Larkin idea; its home. Larkin co. Buffalo, N. Y.

Soup

Franco-American soups; how they are made in a model establishment. c1909. Franco-American food co. Jersey City Heights, N. J.

Sugar

Some interesting facts about sugar. 1912. Distributed by American sugar refining co. 117 Wall st. N. Y. Also other publications.

Sugar cane and sirup making by A. P. Spencer. 1913. Bull. 118. Agric. experiment station, Gainesville, Fla.

Tanning

History of tanning. (hectograph). Pfister and Vogel leather co. Milwaukee, Wis.

Tapioca

The story of tapioca. n. d. Minute tapioca co. Orange, Mass.

Vanilla

About vanilla. c1900. Joseph Burnett co. 36 India st. Bost.

Wood Using Industries

Wood using industries of California by A. K. Armstrong. 1912. State board of forestry, Sacramento, Calif.

Wood using industries of Iowa by H. Maxwell and J. T. Harris. 1913. Iowa state college of agric. Ames, Iowa.

Wood using industries of New Hampshire by R. E. Simmons. 1912. State forester, Concord, N. H.

Wood using industries of Ohio by C. W. Dunning. 1912. Ohio agricultural experiment station, Wooster, Ohio.

Wood using industries of Ontario by R. G. Lewis and W. G. H. Boyce. 1913. Forestry branch, Ottawa, Can.

Wood using industries of South Carolina by Stanley L. Wolfe. 1913. Dep't of agric. commerce and industries, Columbia, S. C.

Wood using industries of Vermont by H. Maxwell. 1913. State board of agric. and forestry, Montpelier, Vt.

Wood using industries of Virginia by R. E. Simmons. 1912. Dep't of agric. and immigration, Richmond, Va.

Woolen Manufacture

City of Manchester, N. H. and the Amoskeag manufacturing company. c1912. Chamber of commerce, Manchester, N. H.
Contains pictures of cotton and woolen manufacturing.

MISCELLANEOUS

Cape Cod Canal

Cape Cod and its canal by J. W. Miller. c1914. Cape Cod board of trade, Sandwich, Mass.

Docks

Seaport studies by Charles E. Fowler in University extension journal, v. 1, no. 1, Jan., 1914. Univ. of Wash. Seattle. Contains bibliography.

Frost

Notes on frost. Revised 1911. Farmers' bull. 104. Agric. dep't, Wash. or, Sup't of doc. Wash. 5c.

Imports and Exports

Trade of the United States with the world 1912-13, imports and exports of merchandise into and from the United States by countries and principal articles. 1914. Miscellaneous ser. 15. Foreign and domestic commerce bur. or, Sup't of doc. Wash. 15c.

Levees

Great American levees by Haviland, Dozier, and Tibbetts. c1913. West Sacramento co. Sacramento, Calif.

Meteorology

Brief list of meteorological textbooks and reference books by C. F. Talman. 1913. Ed. 3. Weather bur. Wash.

National Parks

"Collection of 83 photographs of national parks, in color, of a size to cover a 250-foot wall space in single tier." Loaned for exhibition purposes on payment of transportation charges. Office of the Secretary, Interior dep't, Wash.

Panama canal and canal zone. Public documents for sale by Sup't of doc. 1914. Sup't of doc. Wash.

Panama Canal

Panama canal. 1913. Mentor ass'n, inc. Fourth ave. at 19th st. N. Y. 15c.

World race for the rich South American trade by C. L. Chandler. 1913. Senate doc. 208, 63rd cong. 1st sess. or, Sup't of doc. Wash. 5c.

(Bibliography)

Panama Canal and canal zone. Public documents for sale by Sup't of doc. Wash.

Panama-Pacific International Exposition

Information for visitors. c1913. Panama-Pacific International exposition, San Francisco, Calif. Also other publications.

Panama-Pacific international exposition. c1913. Remington typewriter co. 327 Broadway, N. Y.

Panama-Pacific international exposition. n. d. Santa Fe, 1119 Railway exchange, Chic.

California and the expositions. 1914. Union Pacific system, Omaha, Neb. or, Southern Pacific, San Francisco, Cal.

Pictures

Report of the committee on instruction by means of pictures. 1913. School doc. no 6, 1913. Boston public schools, Bost.

Time

Time taking, time keeping. n. d. Elgin national watch co. Elgin, Ill.

Water Power

Electric power from the Mississippi, a description of the water-power development at Keokuk, Iowa. 1913. Mississippi river power co. Keokuk, Iowa.

Weather Forecasts

Forecasting the weather by George S. Bliss. 1913. Bull. 42. Weather bur. Wash. or, Sup't of doc. Wash. 5c.

EDUCATIONAL EXHIBITS

This list has been compiled from answers to letters sent out to practically all of the American firms listed in the following bibliography and in the bibliographies listed under the heading Industries and commercial products (Journal of Geography, January, 1914), as well as to others not listed. A few of the exhibits cost too much for small schools but are included to make the list useful to large schools.

Bibliography

Educational exhibits by Ellen B. McDonald in Normal instructor, 23:52, Dec. 1913.

Asbestos

H. W. Johns-Manville co. 201-231 Clybourn st. Milwaukee, Wis. Samples of crude asbestos, asbestos fiber and finished product. Free.

Keasbey and Mattison co. Ambler, Pa.
Samples of the crude asbestos, carded fiber and finished product. Free.

Baking Powder

Royal baking powder co. Royal bldg. William and Fulton sts. N. Y.
Illustrates the manufacture of cream of tartar. Free to schools in which domestic science is taught.

Buttons

German-American button co. Rochester, N. Y. Exhibit showing vegetable ivory nut and the processes of manufacture of buttons. 50c.

Carborundum

Carborundum co. Niagara Falls, N. Y.
Samples of crude carborundum and of finished product. Free.

Cement (Portland).

German-American Portland cement works, 140 S. Dearborn st. Chic.
Four glass bottles showing the different stages in the manufacture of Portland cement. Free to schools and educational institutions.

Cereals

Postum cereal co. ltd. Battle Creek, Mich.
Fourteen bottles showing the different stages in the process of manufacturing their products from wheat, corn, rice and barley. Free, charges prepaid.

Cocoa and Chocolate

Walter Baker and co. ltd., Milton, Mass.
Free to schools.

Hershey chocolate co., Hershey, Penn.
Shows the process of cocoa manufacture from the bean in its natural state to the finished product. Free.

Huyler's, S. E. corner 18th st. and Irving place, N. Y. Free.

The Walter M. Lowney co. 486 Hanover st. Bost.
Showing cocoa from the raw bean to the finished product. Free.

Coffee

C. F. Blanke tea and coffee co. 7th and Clark ave. St. Louis, Mo.
About 25 bottles showing the various stages that coffee passes through from the time it leaves the plantation until it is ready for use; contains also samples of different varietes of tea. $3.00, freight collect.

Cork

Armstrong cork co. Pittsburgh, Penn.
Collection showing corkwood in various stages of manufacture. $1.00.

Cotton

Cambridge botanical supply co. Waverly, Mass.
Entire cotton plant, products of cotton seed, etc. $4.50.

Cotton, Spool

Spool cotton co. 315 Fourth ave. cor 24th st. N. Y.
Limited number of spool cotton specimen cases, showing thread in various stages of manufacture. Free on application of principal.

Fertilizers

Swift and co. National stock yards, Ill.
Samples showing fertilizers made from by-products of the packing industry. Free.

Fibre

International harvester co. of New Jersey. Agricultural extension dep't, Harvester bldg, Chic.
Consists of samples of sisal and manila fibre with small sample balls of twine and three booklets. 35c.

Flax

Linen thread co. 96-98 Franklin st. cor. Church, N. Y.
Flax in different stages of manufacture from the raw material to the finished product. $3.00, express collect.

James McCutcheon and co. Fifth ave. at 34th st. N. Y.
Illustrates the various stages in the growth and manufacture of flax. Free to domestic departments of high schools and colleges, freight charges collect.

FLOUR

Hecker-Jones-Jewell milling co. Produce exchange, N. Y.
Furnished only to schools in New York state.

Pillsbury flour mills co. Minn.
Consists of twelve samples showing the different stages of flour manufacture. Free, express charges to be guaranteed by applicant; weight about 18 lbs.

Washburn-Crosby co. Minn.
Supply of exhibits temporarily exhausted. Free to schools or educational institutions.

GRAIN

Commissioner of immigration, Winnipeg, Can.
Samples of grain and grasses in straw and samples of threshed grain.

GRINDING STONES

Pike manufacturing co. Littleton, N. H.
Shows the raw material and finished product. Free.

LIMESTONE

Indiana quarries co. 112 W. Adams st. Chic.
Samples of Bedford limestone. Free.

MILK, MALTED

Horlick's malted milk co. Racine, Wis.
Exhibit shows wheat, flour, barley and barley malt. Free.

NEEDLES

Spool cotton co. 315 Fourth ave. cor 24th st. N. Y.
Limited number of needle specimen cases, showing needles in various stages of manufacture. Free on application of principal.

NITRATE INDUSTRY

Chilean nitrate propaganda, 25 Madison ave. N. Y.
Limited number of lantern slides for distribution, which show the stages in the Chilean nitrate industry

PACKING INDUSTRY

Armour and co. Chic.
Exhibit of by-products. $10.00.

Morris and co. Chic.
Samples of tallow, glue fertilizers, showing by-products of packing industry. Free.

PAINT AND VARNISH

Sherwin-Williams co. 601 Canal road N. W. Cleveland, Ohio.
Shows raw material. Probably free.

Pencils

Joseph Dixon crucible co. 501 Victoria bldg, St. Louis, Mo.
From crude graphite and cedar strips to the finished product. Free to schools.

Eberhard Faber, 37 Greenpoint ave. Brooklyn, N. Y.
Steps in the manufacture of a pencil from crude graphite and cedar strips to the finished product. Free.

Pens

Esterbrook steel pen mfg. co. Camden, New Jersey.
Shows by samples the steps in the manufacture of pens from the sheet steel to the finished product. 10c.

Spencerian pen co. 349 Broadway, N. Y. 25c.

Petroleum

Standard oil co. 72 West Adams st. Chic.
Samples of 21 petroleum products. Distributed only to large schools.

Potash

German Kali works. 1901 McCormick bldg, Chic.
Sent only to institutions in which agriculture is taught.

Rubber

United States rubber co. Broadway at 58th st. N. Y. $10.00.

Salt

Diamond crystal salt co. St. Clair, Mich.
Contains samples of crude salt and of salt in different stages of manufacture. Free to schools on payment of express charges; in middle west charges amount to about 75c.

Worcester salt co. 71-73 Murray st. N. Y.
Samples of salt to schools. Free.

Shears

J. Wiss and sons co. Newark, N. J.
Shows steps in the manufacture of shears. Free, express collect; in middle west charges amount to between 20 and 30c.

Silks

Belding bros. and co. 201 West Monroe st. Chic.
Silk exhibit. $1.25.

Corticelli silk mills, Florence, Mass.
Box of two cocoons, 5c; silk culture chart, 20c; silk culture cabinet, $1.25 if intended for educational exhibit in schools.

M. Heminway and sons silk co. 890 Broadway, N. Y.
Samples of silk cocoons, raw silk and silks in process of manufacture. Free, express charges collect; in the middle west the charges amount to between 30 and 40c.

lands, both through extensive travel and wide reading, have made it possible for him to produce a book which is indispensible to students of earth science in America.

INTRODUCTORY GEOLOGY. By T. C. Chamberlin and R. D. Salisbury, x+708 pages. Henry Holt & Co., New York, 1914. $2.00.

An abbreviation and simplification of the authors' College Geology, intended to present an outline of the essential features of geology with as few technicalities as the nature of the subject permits. Part I deals with geological processes, and the materials on which they operate, while the theme of Part II is historical geology. The book contains the high standards of the earlier geologies by the authors.

ALASKAN GLACIER STUDIES. By Ralph Stockman Tarr and Lawrence Martin. xxvii+498 pages. National Geographic Society, Washington, 1914. $5.00. To be reviewed later.

MINERALS AND THE MICROSCOPE. By H. G. Smith, xi+116 pages. D. Van Nostrand Company, New York, 1914. $1.25.

For those who are beginning the study of minerals and rocks in thin section with the microscope. Deals with the characters of minerals in various sorts of light, followed by descriptions of common rock-forming minerals, and hints on petrology. The subject matter is logically presented and the illustrations are exceptionally fine.

WATER REPTILES OF THE PAST AND PRESENT. By Samuel Wendell Williston. viii+251 pages. The University of Chicago Press, Chicago, 1914. $3.00.

Professor Williston has been studying vertebrate paleontology for more than 40 years, and is one of the leading authorities in this branch of geology. In this book he has succeeded perfectly in his aim of "making the text understandable, and he hopes, of interest also to the non-scientific reader." Those who wish to add to their knowledge of the abhorrent serpents and the certain few poisonous snakes some knowledge of crocodiles, turtles, true lizards, and tuatera or beaked lizards of the past and present, cannot do better than to read this book.

THE NATURALISTS' DIRECTORY. A new edition of the Naturalists' Directory has just been published by S. E. Cassino, Salem, Mass. This directory is invaluable to naturalists since it is the means of bringing together students and collectors in all parts of the world through correspondence. The directory contains an alphabetical list of English speaking professional and amateur Naturalists in all parts of the world, also a list of Scientific Societies and Periodicals. The price of the Directory is $2.50 in cloth binding and $2.00 in paper binding. Sent postpaid. As only a limited edition has been printed it is advisable for any one wishing a copy to order at once.

The JOURNAL of GEOGRAPHY

Volume XIII FEBRUARY 1915 Number 6

THE EUROPEAN WINTER AND THE WAR*

By Robert DeC. Ward
Harvard University

BEFORE considering the effect of the winter upon the military operations in Europe, we may very well review, briefly, the general climatic conditions of the western and eastern theaters of war.

Western and northwestern Europe are roughly similar, climatically, not to the eastern United States but to the Pacific coast of North America north of Oregon. As we go east across Europe the winters become more and more severe, and we find ourselves in another climatic province, which extends from western or central Germany across Russia and far east across Siberia. A somewhat similar "Siberian" climatic region is found in western Canada, east of the Rockies, and extending some distance into the United States. The eastern war area is climatically intermediate between western Europe and central Russia, being less extreme than the latter and more extreme than the former. The plains of Hungary are roughly similar to our own Great Plains, and the Mediterranean portion of Europe is climatically like California.

Western and northwestern Europe are freely open to the sea. Their prevailing westerly and southwesterly winds are tempered by the relatively warm Atlantic waters. Hence the winters are mild. No such extremes of cold occur as are found farther east, at a greater distance from the sea. The average midwinter (January) temperatures over the western war zone are between 35° and 40°, i. e., about the same as those of Baltimore and Washington. In the eastern war area, the midwinter (January) mean temperatures run about 10° lower, or between 25° and 30°. Boston and Buffalo are much like Poland in their average midwinter temperatures. The lowest thermometer readings which observers in the western war zone are likely to make during an ordinary winter average between 5° and 15° Fahr., but they are between —5° and —15° Fahr. in the eastern war area. In any given cold winter, however, the temperatures may fall 10° or so lower than these averages. The effect of winter cold upon navigation is an important factor in all naval warfare. In western Europe, the North Sea harbors remain open, and navigation is not often or seriously handicapped, although occasionally, in severe winters, there is difficulty with the ice along the coasts and in the mouths of the rivers. In the Baltic, on the other hand, ice makes more trouble. Much of this sea is choked by ice, and most of the harbors and even the large rivers freeze. Ice-breakers, however, may be used to keep open the important ports when necessary, except in the farther north. The winters

* An article by the writer, entitled "The War and the Weather During the First Three Months of the Fighting," appeared in the **Popular Science Monthly** for December, 1914, and considered the weather influences upon the military and naval operations from Aug. 1 to Oct. 31. The present article will deal chiefly with the period from Nov. 1 to Jan. 31.

vary a good deal in their severity, and in their effects upon the freezing of the Baltic harbors. Over the eastern war zone the rivers, lakes and streams are ice-bound. The Vistula is usually frozen at Warsaw from the end of December until early in March. The Neva was this year closed to navigation early in November.

European winter weather goes through a series of more or less systematic changes under the control of passing storms which alternate with spells of finer, drier and more settled atmospheric conditions. The weather of Europe is mainly controlled by storms which, coming from North America, or beginning in the ocean area around Iceland, pass northeastwards across the northeastern Atlantic and over or near to northwestern Europe, their influence extending 200 or 300, or more, miles south of their centres. Many storms which we have experienced on our side of the Atlantic later cause snow and rain and gales on the other side. As the storms approach, and pass by, the wind-vanes of central Europe turn, with characteristic regularity, from southeast through south to west, a succession of changes which is, of course, perfectly familiar to us here. Europe thus undergoes many variations of temperature and of weather, as we do, but these changes are, on the whole, less rapid, less frequent and less violent than our own because European storms usually move more slowly and are less violent than ours. The Atlantic Ocean, the Channel, the North and Baltic Seas, and the adjacent coasts, being in the region which is nearest the storm tracks, are all subject to frequent and severe winter gales, with rain and sleet and snow-squalls, rapidly shifting winds, and thick weather. Such conditions make navigation in those more or less landlocked waters difficult and dangerous.

In comparing the western and the eastern theaters of war in winter, it is to be noted that both have advantages and both have disadvantages, from a military point of view. The temperatures average higher in the west. Therefore Belgium and France have more rain, more sleet, more mud, more "slush", than are found in eastern Germany, Austria, and Poland. The cold clear spells are of shorter duration in the west. They are more frequently interrupted by milder temperatures and thawing weather. But this physical relief, from the cold, is gained at the expense of added discomfort and suffering on account of the dampness, the hard marching, and the difficulties of transportation. In the west, the air is damper, so that the same, or even a more moderate degree of cold, often gives a greater sense of chill than where the air is drier. In the eastern war zone there is the disadvantage of greater and more continuous cold, but the advantage of somewhat more settled weather, and usually of more continuously frozen ground. In Belgium and eastern France the Germans find themselves in somewhat milder winter conditions than those which prevail over much of their own country farther east. If the Germans should penetrate into Russia, or the Allies into Germany, both sides would experience a gradually increasing severity of winter cold. Again, the Russians, in advancing westward, would be entering a milder climate than their own.

Most of northern continental Europe has an annual rainfall (including melted snow) between 20 and 30 inches. This is the same as that over a narrow belt in our own country east of the Great Plains, reaching north from the Gulf of Mexico, in Texas, to and across the Canadian line. In the eastern United States the rainfall is heavier. Along the Atlantic and Gulf coasts it averages over 40 inches and in places over 50 or even 60 inches. The rain is fairly evenly distributed through the year over most of Europe. The autumn and winter are somewhat the wetter seasons along the northern coast, while the warmer months are the rainier farther east, as in Russia.

From a military point of view, snow is usually more important than rain. The snow gradually becomes deeper as we go from west to east in Europe, because more of the winter precipitation there comes in the frozen form, owing to the lower temperatures. If all the precipitation of the colder months over the war area fell as snow, the total depth each month would average about 20 inches, this being, roughly, the equivalent of 2 inches of rainfall. Such, however, is not the case. In eastern and northeastern Prussia the ground during each of the three midwinter months is snow-covered for from two to four weeks, the average depth of snowfall per month being considerably less than 10 inches at places from which records are available. Farther east and southeast, in Russian and Austrian Poland, the snow is deeper, and the more severe cold keeps it from melting as rapidly.* These winter snows may become a serious obstacle to military movements, especially during severe and blinding snowstorms which come with cold winds. On the other hand, hard packed snow and frozen rivers and swamps give solid foundation for marching and for transportation.

The mountains of Europe everywhere have deeper snows than the lowlands. The Vosges and the Carpathians, e. g., the one in the western and the other in the eastern theaters of war, both often have their passes blocked by heavy snows. In the western war area the snow is more apt to be wet and to melt quickly, while in the east, it is drier and likely to remain longer on the ground.

Modern wars are intense. They do not come to a dead stop in winter. Armies do not go into winter quarters as they did in the old days. Modern methods of transportation are so well organized that winter storms and cold do not interfere as much as was formerly the case. Yet the movements of the heavy guns, the armored automobiles and the motor trucks of the present-day army are blocked by deep snows about as effectively as was once the case when guns and wagons were lighter, and when horses were exclusively used. And in spite of all our carefully-planned medical and hospital organization, there is much the same bitter suffering among the troops that, in former wars, made winter campaigns in northern Europe so terrible.

* Boston has an average annual depth of snow of 44 inches.

(To be continued)

THE WAR IN THE COLONIES

By Lawrence Martin
University of Wisconsin

The German Empire Overseas

THE colonies of the German Empire, which are threatened during the present war, cover an area of 1,134,640 square miles, or nearly 5 times that of Germany. They contain an estimated population of 13 million persons, including only 25,000 whites, while the parent country in Europe had 64,925,993 inhabitants in 1910. The chief colonies and dependencies are: *German East Africa* and *German South-West Africa*, each larger than the Fatherland; *Kamerun* also in Africa, and nearly as large as Germany; *Togo* on the Gulf of Guinea, and larger than Bavaria; in the East Indies and Pacific Ocean are *German New Guinea*, over half as large as Prussia, the Bismarck Archipelago, Caroline, Pelew, Marianna, Solomon, and Marshall Islands, and Savaii and Upola in the Samoan group; while German's only Asiatic possession is *Kiau-Chau* in China, west of Korea and about half way between Port Arthur and Shanghai.

Part or all of each of these pieces of German territory is now occupied by British, French, or Japanese forces. They have been taken by small detachments of soldiers and marines, sometimes without bloodshed, sometimes with minor skirmishes, and in no case except that of the 3 months' siege of Tsingtau in Kiau-Chau has there been any notable military or naval force.

Results of Extra-European Warfare

The results of the war in the colonies and dependencies of European countries from August 1, 1914, to January 15, 1915, are summarized below. Events in Europe and the Baltic, North, Mediterranean, and Black Seas in Turkish Armenia, and in Morocco and French North Africa, are not included.

GERMANY holds *Walfish Bay*,* a British colony on the coast of German Southwest Africa, and perhaps a town in *British Central Africa*. Her soldiers have invaded *Portuguese West Africa*, *British Cape Colony*, *East Africa*, and *Uganda*, and have repulsed several British invasions of German East Africa.

German cruisers have also done much damage at Papeete in French *Tahiti;* cut a British cable at Fanning Island; bombarded *Madras* in India; sunk a Russian and a French warship in the British harbor of *Penang*, Malay Peninsula; put a British cruiser out of commission at *Zanzibar* off the eastern coast of Africa; destroyed many merchantmen in the *Indian* and *South Atlantic Oceans;* and decisively defeated a British fleet in the Pacific *near the coast of Chile*.

* Recaptured by the British on Christmas day.

Fig. 1. The positions of the colonies of the leading European countries now at war. (Modified from a map in *The Literary Digest*). Neutral territory in white. Of the German possessions (shown in black) 1 is German Southwest Africa; 2, German East Africa; 3, Kamerun or the Cameroons; 4, Togo; 5, Kaiser Wilhelm Land in New Guinea; while the chief German islands (a) of Polynesia as Samoa, (b) of Micronesia as the Marshall, Caroline, Ladrone or Marianna, and Pelew Islands, (c) of Melanesia as the Bismarck and Solomon Islands, are outlined *in black*, as is Kiau-Chau in China.

FRANCE holds parts of *Kamerun,* a German colony in west Africa, captured by French and British forces.

also German Togo, captured by French and British troops.

French warships participated in the blockading of Kiau-Chau, the pursuit of the *'Emden',* and the bombardment of German towns in Kamerun.

JAPAN holds *Kiau-Chau* in eastern China, a German colony, captured by Japanese and British forces.

also *Jaluit,* a German port in the Marshall Islands.

also *Yap,* a German port in the Caroline Islands, the last two to be administered by British forces from Australia after Nov. 18th.

Japanese warships were the most effective at Kiau-Chau; assisted in the pursuit of the *'Emden';* caused a German cruiser to be interned at Honolulu; and captured two German auxiliary cruisers.

GREAT BRITAIN holds *Fao,* a Turkish port on the Persian Gulf, *Basra,* 60 miles, and *Kurna,* 165 miles inland, taken by troops from India.

also *Sheik Said,* a Turkish port, on the Red Sea in Arabia.

also *Cyprus,* a large island in the Mediterranean belonging to Turkey which has been administered by Great Britain since 1878, but is now annexed to the British Empire.

also *Egypt,* a Turkish subject-territory in which a British protectorate is now declared.

also German *Samoa* in Polynesia, captured by New Zealanders.

also *Herbertshohe* and *Rabaul,* German ports in New Pommerania, Bismarck Archipelago, taken by Australians.

also Bougainville and Buka in the *Solomon Islands* of German Melanesia.

also Nauru or *Pleasant Island* in German Micronesia.

also *Kaiser Wilhelm Land* or German New Guinea.

also German *Togo,* in western Africa, captured by British and French troops.

also *Dar-es-Salaam* in German East Africa.

Volunteer troops and regulars in British East Africa have repulsed several German invasions.

also *Kamerun* (see statement above under France).

also *Kiau-Chau* (see statement above under Japan).

also *Swakopmund* and *Luderitz Bucht* in German Southwest Africa.

Loyal colonial troops in British South Africa have put down a Boer revolution, and turned back several small German invasions.

The British warships have bottled up the *'Konigsberg'* and destroyed the *'Emden'* in the Indian Ocean; destroyed the German fleet in the South Atlantic *near the Falkland Islands* and Strait of Magellan; bombarded several Turkish and German ports; taken many German merchantmen; and confined the rest to neutral ports.

The AMERICAN fleet, including the Christmas Ship *'Jason'* with 5,000,000 toys and pieces of clothing for children in the Old World, the Red Cross ship *'Hamburg'*, the Rockefeller Foundation relief ship *'Massapequa'*, and other vessels from the United States, laden with food for the Belgians, cotton for the Austrian hospitals, etc., have taken every port in Europe by storm.

Geographical Relationships

Why was it that New Zealanders took German Samoa, while Australian troops captured the chief German port in the Bismarck Archipelago? How did it come about that Germans were able to acquire and hold England's colony on the southwestern coast of Africa, that French forces were the aggressors in Kamerun, Japanese at Kiau-Chau and the Marshall and Caroline Islands, and soldiers from India in Turkish Fao and Sheik Said? Geographical relationships help to explain all these apparently-complicated colonial campaigns of tiny groups of soldiers which have already resulted in the possibility of vast changes in the map of the world, in contrast with the slight shifting of the map of Europe where the largest armies the world has ever seen are at a deadlock. It seems worth while for teachers of geography to consider the geographical features of the war in the colonies in some detail, especially as we may soon be reading of larger conquests by Boer, Indian, Portuguese, Australian, and perhaps Japanese troops, for Germany seems to have no way of sending reinforcements to her colonies.

Sources of Information

The facts regarding the war outside Europe have been published in the daily papers in America, in the London *Times*, in the department headed *Unsere Kolonien und der Krieg* in the weekly edition of the *Tagliche Rundschau* of Berlin, and in the monthly issues of *United Empire* published in London. The monthly numbers of *Koloniale Monatsblätter* and *Koloniale Rundschau*, both published in Berlin, were not seen for issues later than August, 1914.

Reading for Teachers

The geographical significance of the series of events can only be appreciated by referring to a good atlas or globe, or even such an outline map as is published with this article (Fig. 1). Statements in English regarding the topography, climate, products, population, trade, garrisons, etc., in addition to the generally-excellent descriptions in the grammar school geographies, will be found in the *Statesman's Yearbook* for 1914, in Chisholm's *Handbook of Commercial Geography*, in Bartholomew's *Atlas of the World's Commerce*, in Jefferson's *Atlas of Commercial Values*, in Mill's *International Geography*, in the volumes of Reclus' *The Earth and its Inhabitants* and Stanford's *Compendium of Geography and Travel*, in the *Baedeker Guide Books*, and in the more recent encyclopedias.

Reading for Students

The books listed above are adapted for reading by teachers, and their more mature students, but the pupils may very well be set to looking up (a) certain products and trade routes in the *Commercial Geographies* of Adams, Brigham, Gannett, Redway, Robinson, Smith, Lyde, Morris, Trotter, Gregory, Keller, and Bishop, and others, or (b) specific places, alluded to in the war news, in the *Geographical Readers* by Carpenter, Chamberlain, Winslow, Rupert, Huntington, King, and others, in Herbertson's *Descriptive Geography from Original Sources*, Lyde's *Geographies of the Various Continents*, in such series as *Little People Everywhere, Around the World, Peeps at Many Lands, The World and Its People, Boy Traveller, Family Flight, Zig-zag Journeys, Home and World, Highways and Byways, People and Places, Youth's Companion Series, Little Folks from Many Lands, Scenes from Every Land*, etc. They may also look up pictures in the back numbers of the *National Geographic Magazine, The World's Work, Harper's, Scribner's*, and other magazines. Best of all they may now, more profitably than at any time in the history of the world, have their interest stimulated by some bit of war news and then be sent to the school reference shelf or the public library to look up some topics and countries alluded to in the *References to Books and Articles* in such geographies as the Tarr & McMurry, Dodge, King, Redway and others.

War Maps

The writer has found it profitable to make a flag map in accordance with the following plan: Take a large wall map of the world on Mercator projection. Buy a quantity of tiny flags of foreign countries (40 cents a gross). Pin a flag, say of Germany, Japan or Great Britain, at each place alluded to in the list on pages 172-175. where conquest of colonial territory has taken place, as at Walfish Bay, Kiau-Chau, Togo, etc. The pin holes do no serious damage to the map.

Pin other flags at places where naval battles have occurred, as (a) southwest of Valparaiso in Chile, (b) near the Falkland Islands, (c) at Cocos Island where the *'Emden'* was destroyed, and so on. On these latter flags place gummed numbers. Make a legend explaining these numbers, to attach to the map. It might read, for example: "1. German cruisers sink 2 British cruisers; 2. British fleet sinks 4 German cruisers; 3. German cruiser *'Emden'* bombards Madras; 4. The *'Emden'* sinks a Russian and a French warship at Penang; 5. Australian cruiser sinks the *'Emden'*."

Next, connect by threads the flags at Madras, Penang, and Cocos Island and you have a rough route of part of the cruise of the *'Emden'*. Do the same with strings or colored threads between the flags showing where two German cruisers bombarded French Tahiti in the Society Islands, and where they fought the English off the coast of Chile, and later near the Falkland Islands. To this thread will be attached one indicating the route of another German

cruiser from Yap in the Caroline Islands to Fanning Island, where a British cable was cut, and St. Felix, where a collier was destroyed. Another thread joining these two will come from San Francisco, where a German cruiser started on her way to join the fleet which fought off the Chilean coast.

As an antidote for all this warfare, put in pins and a thread to show the route of the American Christmas Ship *'Jason'* from New York to Plymouth, England, Marseille, France, Genoa, Italy, and Salonica, Greece.

If flags are not easily obtainable take ordinary pins and use pieces of red paper for British flags, black for German, blue for French, white for Japanese, etc. The plates at the front of Webster's Dictionary show flags, which students might copy, using colored pencils.

School children of all ages from the grades to the high school, normal school, and university can play this geographical war game with pleasure and profit. If they are allowed to do the looking-up of places, the pinning of flags, and the stretching of threads for themselves they will remember the location of Madras, Tahiti, the Falkland Islands, Zanzibar, Plymouth, Samoa, etc., all the rest of their lives. The facts can be stated without prejudice, so that no race antagonism or war spirit need be stirred up by the study of the geography of the war in the colonies.

Of course the same methods apply equally well to a graphic representation of the campaigns in Belgium, France, Poland, East Prussia, Galicia, Servia, and Armenia upon a map of Europe.

Germany's Relationships With Her Colonies, Contrasted With England and France

In these instances of extra-European warfare the geographical factors of the peripheral settlement and the undefended seaport constitute a weakness especially if the German influence is strictly limited to the port, as in many new colonies and most tropical dependencies. French, Japanese or British ships could capture such German colonies as Samoa, Togo, or Kaiser Wilhelm Land, and perhaps Kamerun, by bombarding the seaports, and then starving out the traders and colonists in the interior, provided there were no German navy at large upon the seas. It would require an army, however, to conquer most of the important British colonies, which have been established longer, contain a larger white population and have in the interior farms and towns which are populous and more nearly self-supporting, as in British South Africa. This is also true in a measure of German East and South-west Africa. The German colonies are also too new to send troops to the defense of the parent country as the British colonies of Canada, Australia, New Zealand, and India, and the French colonies of northern Africa, are doing. The colonies and foreign possessions of Germany are all young, so that her present trade with them is relatively slight compared with her trade with the United States, Russia, and other foreign countries. Germany's exports are worth nearly 2,500 million dollars, while her imports exceed 2,600 million dollars annually, but only about 1/55 of this trade, or 92 million dollars, is with the

dependencies of the German Empire. Their total trade in 1912 was 114 million dollars.

The trade of France with her colonies was about 137½ million dollars in 1912, the exports and imports being about equal in value; but in addition these colonies had a trade of over 171 million dollars with other countries. The total exports and imports of France in 1913 were valued at nearly 3077 million dollars. This is less than half as much as the total trade of Great Britain, however, which was worth almost 7021 million dollars in the same year, but Great Britain's trade with India, and with her dominions, colonies, protectorates, and dependencies constituting the British Empire, aggregated some 2000 million dollars. This great colonial trade in the long-established, far-flung British Empire, in contrast with the little trade of the thirty-year-old colonies of Germany, with less than one-seventeenth of this amount, suggests the stakes for which the European countries are playing on the high seas and in the antipodes. It emphasizes the importance of the war in the colonies.

THE ASSOCIATION OF AMERICAN GEOGRAPHERS

THE eleventh annual meeting of the Association of American Geographers was held in Chicago on December 29 and 30, 1914. The President, Prof. A. P. Brigham of Colgate University, gave an address on "Problems of Geographic Influence." Prof. N. M. Fenneman of the University of Cincinnati conducted a Round Table on "The Delineation of Physiographic Provinces in the United States." Prof. R. D. Salisbury gave an evening lecture on Porto Rico. Thirty-seven papers were offered, 6 dealing with Physiography, 2 with Climatology, 1 with Oceanography, 3 with Regional Geography, 5 with Economic Geography, 9 with Anthropogeography, 5 with Political Geography, 4 with Educational Geography, and one each with Phytogeography and with Exploration. A dinner was held the evening of Dec. 30.

Teachers of geography will be especially interested in the endorsement by the Association of American Geographers of the scheme for forming a National Association of Geography Teachers, as suggested by Mr. G. J. Miller in the *Journal of Geography* for October.

For the coming year the Society elected the following officers: President, R. E. Dodge; First Vice-President, Mark Jefferson; Second Vice-President, Frank Carney; Secretary, Isaiah Bowman; Treasurer, F. E. Matthes; Councilors, William Libbey, R. DeC. Ward, and A. H. Brooks. The Society accepted with regret the resignation of Prof. R. E. Dodge as Editor of the *Annals of the Association of American Geographers*, appointing Prof. H. H. Barrows in his place. The attendance was about 50. The Society is indebted to Professors Salisbury, Goode, Barrows, and Tower and to the University of Chicago for entertainment and for luncheon on Dec. 29 and 30.

The *Annals* of this society, advertised on a later page, would be a substantial addition to the library of any normal or high school.

A GLIMPSE AT NEBRASKA INDIAN GEOGRAPHY

By Melvin R. Gilmore
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WHEN the nature and scope of what is here termed the Indian Geography of Nebraska is understood, it will be seen that the limits of this paper can afford only a glimpse of the subject.

Since geography is the study of the earth's relation to life, the science may be divided into physical geography and biogeography. Physical geography deals with the natural conditions of land, water and air, and their interrelations. Thus we may consider the physical aspects of the earth as a whole or of any part of it. Biogeography, or the study of the life relations, depends upon the physical geography. Biogeography is considered under the subheads, phytogeography, zoogeography, and anthropogeography, or the distribution and activities of mankind.

Indian geography of Nebraska, is a discussion of this region in relation to the occupation by the aboriginal tribes. A moment's thought gives us to understand that the distribution and interrelations of all forms of life have greatly changed in the last century, and especially in the last half century. In that time, the human population of Nebraska has not only increased from probably twelve thousand persons to more than one hundred times that number, but the native race and all its activities have been replaced by a population, which, though, in some degree cosmopolitan, is overwhelmingly European racially and wholly European culturally. Strange as it may seem I daresay that much less is known of the arts and industries, the food, the clothing and housing, the political organization, the religious and philosophical attitude of mind of our native Americans, than is known of the Asiatic races. We know more of the mythology, the literature, and the government of Japan than we do of the myths and mythological places of Nebraska, or of the stories and the political structure of the tribes which so recently occupied the region where we now reside. We know more about the sagas of Norway than we do about the hero songs of the Omahas and the Pawnees.

The great change in the human population has involved enormous changes in the character and distribution of the plant and animal life in this region. Within less than forty years the native prairie flora has been wholly eradicated from vast areas. These tracts have been planted with grains, grasses, fruits and vegetables which we brought with us from Europe, besides the dandelion, burdock, mullein, catnip, and many other plants which have accompanied us and have established themselves just as the rats and mice also have done. Besides this, towns and cities and roads have been built, and groves and parks have been planted where no forest growth was seen before. Accompanying these floral changes necessarily have come great faunal changes. Where herds of tens of thousands of the native American cattle, the buffalo, grazed only a few decades ago not one individual is now to be seen. Instead there are herds of European cattle. And so with the deer, antelope, and other native animals; they have been displaced by animals from Europe.

A year ago White Horse, of the Omahas and over 80 years old, said to me: "When I was a youth, the country was beautiful. Along the rivers were belts of timber land, where grew cottonwoods, maples, elms, oaks, hickory and walnut trees, and many other kinds. Also there were various vines and shrubs. And under all these grew many good herbs and beautiful flowering plants.

"On the prairie was the waving green grass and many other pleasant plants. In both the woodland and prairie I could see the trails of many kinds of animals and hear the cheerful songs of birds. When I walked abroad I could see many forms of life, beautiful living creatures of many kinds, which the Master of Life had placed here; and these were, after their manner, walking, flying, leaping, running, feeding, and playing all about.

"Now the face of the land is all changed and sad. The living creatures are gone. I see the land desolate, and I suffer an unspeakable sadness. Sometimes I wake in the night and I feel as though I should suffocate from the pressure of this awful feeling of lonesomeness."

The subject of my paper comprehends only something of the geography of Nebraska relating to its occupation by the tribes of the American race. First of all it should be remembered that the American race is not all one people, but comprises many stocks, just as does our Indo-European race. There are fifty-six different linguistic stocks in North America north of Mexico. Of these there are within the bounds of the United States tribes speaking two hundred languages. In Nebraska there are tribes of three different stocks speaking at least six different languages. These stocks are the Siouan, Caddoan, and Algonquian. Of the Siouan stock there were in the region of the North Platte River and along the northern border of what is now Nebraska several tribes of the Dakota Confederacy. On the lower Niobrara River was the Ponka tribe. The Omaha were in northeast Nebraska, and the Oto in the southeast. West of the Omaha and Oto was the Pawnee nation of four tribes, extending from the Niobrara River southwestward to the Solomon River. The Pawnee nation is of Caddoan stock. The Cheyenne and Arapaho of the Algonquian stock lying in eastern Colorado extended over a little of the southwest part of Nebraska. Among these tribes the relations sustained between the Omaha and Pawnee were uniformly friendly; the relations between these two tribes and the Dakota were uniformly hostile. As for the relations between these and the other tribes of the region, they were sometimes friendly and sometimes hostile. The Cheyenne and Arapaho held the farthest southwestern outpost of the Algonquian stock, their nearest relatives being the Chippewa of Minnesota, from whom they had been wedged off by the intrusion of the other two races, the Caddoan and Siouan. The Pawnees had migrated into this country from the southwest. According to their own traditions and from other evidence, it appears that the tribes of the Siouan stock had migrated from the east, their westernmost group, the Teton Dakota, reaching the Black Hills about the end of the eighteenth century. Ever since they seem to have been pressing southward upon the Pawnees, so much so that just before the settlement of Europeans in this region, the pressure had

compelled the Pawnees to abandon their villages on the Loup River and on the middle course of the Platte and to settle on the farthest eastern verge of their territory close to the Omahas and the Otos. The sites of these settlements are at the present town of Leshara and just across the Platte opposite Fremont.

The circumstances of physical environment surrounding the tribes of the plains of western America were less favorable to advancement than the conditions which surrounded the tribes of western Europe where our civilization developed. Still, these tribes had come an immense distance on the road from savagery to civilization. They contained in embryo all the powers and capabilities for achieving a form of civilization of their own, which would, of course, differ from that achieved by our own race in other environments, but still a manner of social and industrial life containing all the essentials of that organized complex of activities which we call civilization.

Before the advent of the European there was no beast of burden in North America except the dog. This limitation was an important factor in the control of certain forms of activity. However, in the arts of life there had been some attainment in agriculture, architecture, weaving, dyeing, basketry, pottery, and pictography. The tribes had developed systems of government, rituals of religion, and the beginnings of medical and surgical practice. They had also incipient forms of literature and the art of music. They had their historians, their geographers and explorers.

The character of the floral life of a country is a strong factor in determining the faunal life, and both are highly influential in shaping the material culture of the human inhabitants. The physical environment and material culture are reflected in the intellectual, religious, and philosophical expressions of a people's life. Their myths, legends, rituals, stories and songs are to be fairly interpreted only in the light of knowledge of the material basis. The character of the arts and industries and religious observances of the various American tribes were largely conditioned by the distribution of the native wild plants which supplied their alimentary, medical, and protective needs. Certain of their uses, when known to us, may be suggestive of possibly useful acquisitions to our list of plants of economic value to our agriculture and horticulture. Since these plants have already naturally established themselves here they must be fairly well adjusted to the physical conditions here prevailing. It is reasonable to suppose that if promising species were subjected to cultivation and selective breeding they would show as much improvement and more hardiness than representatives of the same orders which we have brought with us from the old world, for the wild ancestors of our common cultivated plants were probably no more promising in their original wild condition than the native plants are here.

Besides the wild fruits, nuts, tubers, and seeds which were regularly harvested from the wild growths by the tribes of Nebraska, they had also certain crops which they regularly cultivated. They planted fields of corn,

beans, squashes and pumpkins, gourds, watermelons, and tobacco. They had all the types of corn and many varieties of each type, especially of flour corn. They planted the different varieties in separate fields to avoid hybridization. Their beans, squashes, and pumpkins were of many varieties.

All the tribes in the Missouri River basin lived in permanent villages of which the major controls determining their location were the presence of wood, unfailing water, and sufficient ground suitable for tillage where they could plant their fields. Then the abundance of game and wild fruits and other useful vegetal products had their influence as contributory factors; thus the proximity of the Missouri River and of the Elkhorn, Platte, Republican, Blue and Nemaha Rivers were favorite places of abode.

The villages were not laid out in blocks but consisted of an irregular cluster of houses without streets. The mode of structure of these houses shows the influence of physical environment upon the type of architecture. While the tribes in the heavily forested eastern part of the continent used logs for building, or a covering of bark over a frame of posts and poles, here, because of the scantier supply of timber a different house was evolved. A building site was chosen and a circular space of twenty, thirty, forty, or fifty feet in diameter was excavated to the depth of a foot and one half or two feet, a bench of earth of suitable width to serve as a seat by day and a bed by night was left at the circumference of the circle. Near the center four heavy forked posts fifteen to twenty feet high were set. Then a circle of posts was set where the wall was to be. These posts were shorter than those in the center in order to give slope to the roof. In the forks of all these posts, timbers were laid which supported the rafters. Poles were then laid on the rafters, interwoven with willow withes and thatched with prairie grass. Over all this a firm covering of earth was laid. Light and ventilation were had by a circular opening in the dome of the roof. The fireplace was in the center of the floor. In order to control the draft of this opening so that the wind would not drive the smoke back, a frame was erected around it so that a mat or skin could be laid up on the windward side. A vestibule about ten or fifteen feet long and seven or eight feet wide and eight feet high was placed at the east side of the lodge. This was the only entrance. In the yard near by was a scaffold for drying meat, pumpkins, and wild fruits for winter stores of food. Another adjunct of the dwelling was the bathlodge. This was a small dome-shaped frame of willow poles over which could be thrown mats or skins; in the center was a number of boulders. These boulders being heated, water was poured on them to cause steam for a vapor bath.

In travel, the shelter was the conical tent with a hide cover which could easily be folded and carried on the march. The camp was arranged in a circle, each band of the tribe having its own place in the segment. So a man coming into camp at any time of day or night and at any place wherever it might be, would know at once where to find his own family.

In erecting the tent three of the poles were first tied together with a long rope. The three poles were then set up with their bases spread the distance of the diameter of the tent. The other poles, in all about a dozen, were laid in the fashion of soldiers forming "stack arms", and the long rope before mentioned carried round the circle of poles and tied to one of them to make the tent frame firm. Next the cover was drawn up and secured by fastening it together at the front. Then the smoke flap poles were inserted in their sockets so the smoke flaps could be manipulated, opening towards the lee side of the tent to give good draught and ventilation.

The hunt was organized and officered under strict discipline, for it was a socialized industry and any mishap might subject the whole tribe to great hardship and suffering or even famine. So plans for the apprehension of the herds and the killing, skinning, and cutting up of the meat had a definite duty in what was a community undertaking for the common welfare.

Certain minerals were of economic use to the Indians. Salt was obtained near where the city of Lincoln now is. Salt was also sometimes imported from regions in Kansas and Oklahoma. Certain clays were used for making paints, others for dyes. Bentonite was used for cleaning feathers and furs. A medicinal clay was obtained in Colorado somewhere in the vicinity of Denver. It was applied for the reduction of inflammation. Selenite crystals were reduced to powder by heat and the powder was used in cleaning off the excess glue after attaching an arrowhead to the shaft. Catlinite, or red pipestone, was prized by all tribes for pipe-making. It was obtained in southwest Minnesota.

Previous to the appearance of the white man upon their horizon, the tribes had rules and methods of procedure, but by European incursion there was thrust upon them a train of problems without precedent and they had to make the best of a desperate situation. Not the least bewildering of the new ideas thrust upon them was that of individual holding of land regardless of use. This idea and that of alienation of lands was contrary to their customs, to their conceptions of justice and reason, and to their religious ideas.

Within the bounds of the tribal domain the land was held as common property of the tribe in its corporate capacity; none was held in fee by any individuals or group of individuals. But in suitable situation, convenient to the village, each family chose such ground as it needed and could cultivate. Such a piece of ground was held in undisturbed possession so long as the family kept it in actual cultivation and use, but, if cultivation of it lapsed, it was subject to reapportionment for use; for the idea of monopoly and speculation in land or of alienation of the same was just as foreign to the Indian mind as the same process in regard to the air or water or any other natural resource needful to the sustenance of human life and equal human opportunity.

Along with the idea of the common right of all men to a dwelling place on earth, the American tribes held to the idea of the common right of all men to the natural products of the earth so far as they needed and could use them;

the natural and common right to plants for any use, for food, timber, fiber, and so forth; the right to natural mineral products, as salt, catlinite, bentonite and other clays; the natural and common right to fish and game. No individual or group of individuals was allowed to monopolize any natural resource. No person or corporation could hold the location of deposits of salt, clays, or any other natural product to the exclusion of others. Everyone had equal opportunity of access to natural products; but individuals who put forth effort and possessed themselves of any natural substance thereby made it their own property and had the right to give it away, or trade or dispose of it as they saw fit. What a man's efforts produced were his own, but the bounties of nature were common wealth.

Indian geographic names ought to be ascertained and preserved for the purpose of history and scientific study, if for no other consideration. But these are not the only grounds for their preservation. They give distinctive character to local nomenclature, and perpetually recall events and circumstances of romance, and stimulate the imagination.

All of our rivers and creeks, lakes, notable hills, and other natural features have different names applied by each tribe acquainted with them. Thus the great river along our eastern border is called Mini-shosè by the Dakota, Ni-shudé by the Omaha, and Kits' Paruksti by the Pawnee. These are descriptive names and show something of Indian psychology. The Dakota noting the turbidity of the stream, called it Muddy Water, *mini,* water, and *shose,* muddy. Another feature impressed the Omaha mind. Bars of very fine white sand are frequent in this river. As an instance to show the poetic interpretation of natural phenomena by the Indian mind, I may relate an incident. One time, driving towards the Missouri River in company with an Omaha Indian, he drew my attention to the appearance of the sky close to the horizon just above the river. The summer sun was bright and the seasonal south wind was blowing strongly. Just above the river drifted white, trailing clouds of the fine sand from the bars. He pointed and said: "Now you see why we call this river Ni-shudé." *Shude* is the Omaha word for smoke, and *ni* is the word for water. The awe and wonder pertaining to this stream impressed the mind of the Pawnee and they called it the River of Mystery, Kits' Paruksti. In the Pawnee language, *paruksti* means wonderful, mysterious or sacred, and *kitsu* means water.

The name of our state is itself a variation of the Omaha name of the largest river within the state, Ni-bthaska; Flat Water. The French explorers in mapping the region rendered the name into their language, so we have it Platte River. The Omaha name is strikingly descriptive of the river, *bthaska* means flat, and *ni,* water. The Pawnee also call it the Flat River. In their language it is Kits' Katush, from *kitsu,* water; and *katush,* flat.

The Dakota call it Pankeska Wakpa, Shell River, from *pankeska,* shell, and *wakpa,* river. This name commemorates the fact that formerly the Dakota were accustomed to obtain shell ornaments by barter from another tribe

which they met at this river. The name of Niobrara River is a variation of its Omaha name, Ni-ubthatha, Spreading Water, from *ni,* water, and *bthatha,* spreading. The Dakota name of this river, which is Mini Tanka Wakpa, carried the same idea, from *mini,* water, *tanka,* large, and *wakpa,* river. The Pawnee name is also descriptive, but seizes upon another characteristic. Their name for it is Kits' Kakis, Running Water, or Swift Water, from *kitsu,* water, and *kakis,* swift.

The Sand Hills, a distinct topographic area of Nebraska, is called Chasmuta by the Dakota, from *chasmu,* sand. The Omaha call this region Pahe Pisa, from *pahe,* hill, and *pisa,* sand.

These are a few of the geographic names current among the tribes of Nebraska, and will serve to show their manner of applying place names. Some of their names are descriptive of physical aspects or of supposed occult properties, other are commemorative of events or of men.

NOTES ON THE HUMAN GEOGRAPHY OF AN OIL FIELD

By John L. Rich
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Introduction

THE following discussion, which relates particularly to petroleum, but in many of its aspects applies as well to natural gas, is an attempt to present from the standpoint of one phase of modern geography certain characteristic features associated with the development of an oil field. The particular human "responses" commonly associated with oil are described, analyzed, and their causal relation to the basic facts concerning the nature and occurrence of the resource demonstrated. The discussion is based on the idea that these human responses include any distribution of population, either permanent or temporary; any grouping or arrangement of cultural features such as buildings, roads, etc., or any peculiarities, either physical or psychological, of man himself which are characteristically and causally associated with, and controlled by, a natural resource or such other basal geographic elements as topography, soils, climate or location. These responses demand description and their causal relations call for demonstration and analysis.

Each of the natural resources utilized by man necessarily exerts an influence whose character and strength depends, in the main, on the nature of the resource—its distribution; its physical properties, and the means by which it is procured. All these determine in large measure the part which it plays in the life of man and in the geography of the region where it occurs.

Significance of Nature and Mode of Occurrence of Oil

Two peculiarities of the mode of occurrence of oil are among the prime factors upon which its geographic significance depends: These are (1) its occurrence deep down within the earth entirely out of sight, often with no surface indications of its presence, and (2) its localized distribution within

the general producing area. The combined effect of these peculiarities is to introduce into the prospecting for and development of oil fields a strong element of uncertainty and risk of loss while at the same time the nature of the resource insures an easily gained fortune to those who make a lucky strike. The effect, in short, is to introduce a strong gambling element, and to promote the "boom" or "rush" response wherever a successful field is found.

Before proceeding to the discussion of these responses it might be well to consider a little more closely the factors mentioned above. In most cases the oil lies far underground and gives no direct indications at the surface of its presence below. Occasionally a seepage at some spring or watercourse attracts attention and leads to drilling, but in many cases the discovery is entirely accidental—made in the course of drilling for water or of random prospecting for oil. Whether or not oil will be found in an untried area becomes, then, in the absence of expert examination, merely a gamble. The invisibility of the oil-bearing sands tend to increase the element of mystery which, in the popular mind, is likely to be associated with the whole subject of the distribution of oil and thereby to increase the effectiveness of the gambling element connected with its development.

Further, the laws of accumulation of oil are such that its distribution is often exceedingly irregular, even within the general oil field. Producing wells and dry holes occur in close proximity and even on adjoining locations. In most fields the oil is found only where the rock structure is favorable for its accumulation in considerable quantities. Such structures are the crests of anticlines and domes or places where dipping rocks locally flatten out into terraces. Wherever ground water is present, oil, being lighter than water, tends to migrate up the dip of the rocks. Wherever, in its upward migration, it encounters such structures as those mentioned, especially if they include an impervious stratum, it tends to accumulate.

Even favorable structures, however, do not yield oil in quantities unless a porous stratum is present which is capable of holding the oil and delivering it quickly when a well is drilled. Moreover, oil is not always found even in cases where a suitable "sand" is present and structures are favorable, for a break in the impervious stratum above, or various other conditions may have allowed its escape. Thus, even after examination of the structure by a trained geologist, a considerable element of uncertainty necessarily enters into the search for oil.

The "Rush" Response

The first well in an untried region is almost a pure gamble and its sinking is accompanied by many of the features of a gamble. Curiosity is rife and the well is constantly visited by a throng from far and near. At one such well a booth established for the sale of soft drinks to the visitors seemed to be flourishing. When the well approaches the depth which it is expected will determine whether or not it is to be successful, the excitement increases. Amidst a crowd of expectant onlookers drilling is continued throughout the

night by the aid of torches. Should the well prove successful the rush begins. Quickly the news spreads to all the country round. There is a scramble to secure leases on farms situated near the successful well. Oil men from far and near come in, each vying with the others to obtain favorable leases. Speculators lease large tracts in the hope of disposing of them at a profit to some one of the bona fide oil companies in case the field develops as is hoped. All the towns in the neighborhood become the centers of ceaseless activities; hotels are crowded; garages are filled to overflowing; even the railroads are forced to extra efforts in order to accommodate the increased traffic involved in the bringing in of the necessary drilling outfits, casing, and other supplies. Drilling outfits are put into position with feverish haste, each company endeavoring to get its wells down first to reap the benefit of the greater flow which comes from the first wells, and which may be greatly cut down as neighboring wells are sunk. Soon the oil field becomes a forest of derricks.

Following the rush to the immediate neighborhood of the first well, there usually comes more or less of the so-called wild-catting—the sinking of wells in surrounding territory in the hope of striking new fields, or of locating the continuation of the main field. The most striking characteristic of this wild-catting is its blind, groping nature, and the predominating element of pure gamble which is, therefore, involved. This is especially conspicuous in such a region as Illinois, since the glacial drift obscures the underlying rock structure—the only possible guide which might be used in the intelligent location of outlying wells. It is true that the geologist is now being called upon to some extent to determine in advance the structure of the area, and therefore the most favorable locations for development work, but in most cases the blind and expensive method of cut and try is still in vogue.

Interesting psychological responses associated with the gambling element already described are almost invariably noticed in connection with a newly opened oil field. Excitement is in the air, everyone is talking oil, and every stranger is suspected of being an oil man seeking leases. Almost every landowner for miles around will tell you that somewhere on his place, in a well or spring, or along a stream, there is a peculiar scum on the surface of the water, which he is sure is oil.

Another of these responses probably has its root in the obscure and, to the lay mind, rather incomprehensible facts controlling the distribution of the oil. Practically without exception, the landowner on whose farm a dry hole has been put down will assure you with the utmost confidence that he is certain the drillers struck oil in that well, but are concealing the fact. He cannot see any reason why oil should be found on his neighbor's farm, but not on his own, and he is suspicious of everyone.

Influence of Topography

In a district already proven, topography plays a subordinate part in the location of individual wells, since, as a rule, there is no necessary connection between the underground structure, which controls the distribution of the

oil, and the surface topography. Topography does, however, effect the depth to which it is necessary to drill, and the ease with which the drilling materials may be put in place. It is also an important element to be considered when it comes to the question of installing the pumping apparatus to be described in a following paragraph.

Topography seems to exert a marked influence on the location of the wild-cat wells, at least those whose sites are chosen by the old blind method, for, since it is in the valley bottoms that the amount of rock drilling necessary to reach a given stratum is least, it is there that the majority of the wild-cat wells are located.

Cultural Features

Besides the "rush" response, whose geographical basis we have just outlined, a successful oil field calls into being a number of distinctive cultural features which must be considered as geographical phenomena associated with, and dependent upon, the exploitation of this particular resource. The forest of derricks, already mentioned, which is so conspicuous, though transient, a feature in certain oil fields, is of course a response to the necessity of drilling to secure the oil. Probably the next most striking features, which include the pumping house and the arrangements for pumping the wells, result from the necessity, at least in most fields after the first few days, of pumping the wells in order to maintain a continuous flow of oil. From the pumping house, which is usually a rather plain structure, large enough to house a good-sized oil engine with various accessories, there radiates to the wells a series of "pull rods" connected with them by an arrangement, the "jack" whereby a pull on the rod actuates the pump. At the pumping house the rods are hooked to a large drum, the pull wheel, which, as it constantly turns back and forth through about one-fifth of its circumference, gives the necessary pull to the pumping rods. These rods must be kept fairly straight, hence in rough country considerable difficulty may arise. Where the country is not too rough they are supported on stakes driven into the ground to such a depth that their tops give the desired gradient. The squeaking of the pumps, and of these rods as they move back and forth over the tops of the stakes, is an exceedingly characteristic sound in an oil field, as is also the constant chug-chug of the pumping engine.

Besides the pumping house, rods and jacks, there is usually associated with each group of wells, at least with the wells of each distinct company in the field, one or more tanks for the storage and measurement of the oil before it is pumped away through the underground pipe lines to distant refineries or storage tanks. In addition there is likely to be found at some point convenient to a railroad in the neighborhood of any large oil field, a so-called tank farm, which is merely a considerable area given over to the storage of oil. Such a farm may number hundreds of steel tanks, each nearly a hundred feet in diameter and about thirty feet in height, set at nearly uniform distances of about three hundred feet from each other for protection in case of fire. Such

a tank farm is a sight calculated to impress one in a never to be forgotten way with the enormous amount of liquid fuel which is wrested from the earth in some of these larger oil fields.

Pumping arrangements, settling tanks, pipe lines, storage tanks and tank farms all must be looked upon as responses induced by the liquid nature of the resource, and quite different from those associated with resources of other kinds.

After the first boom of a new field is over, and most of the drilling is done, the human response to oil contrasts strongly with that to coal, iron or most of the other mineral resources. In the case of coal, there are the mines with their extensive buildings and equipment, the railways and tramroads, and finally the mining town with its more or less characteristic population. Such resources draw to themselves a considerable permanent population. Not so with oil: One or two men at each of the pump houses, and a few gangs engaged in repairing pumps, pipe-lines, etc., constitute nearly all the people who remain in the field after the drillers depart.

Influence Upon Agriculture

When it happens that an oil field is discovered in the midst of a good farming region, the influence of its development upon agriculture is striking and usually deplorable. The large sums of money which the owners of the farms often receive from leases or in royalties not infrequently result in the farmer's moving to town, leaving the farm to a tenant, or even in extreme cases, abandoning it altogether. Fields completely run to weeds, unkempt fences, and uncut crops were most common features in one such area recently visited. The gambling spirit and the spirit of "get rich quick" which certainly is very pronounced in the early history of an oil field, must be presumed to have their influence upon such farmers as remain and to discourage the hard labor necessary to secure the slow but surer rewards of farming.

Aside, however, from such psychological effects, the development of an oil field exerts in a most practical way its detrimental influence upon the agriculture of the region, for the derricks, the wells, and the numerous pumping rods radiating in all directions from the pumphouses interfere very seriously with the cultivation of the land and, in some cases, where the wells are thick, actually make cultivation almost impossible except by hand—a method which is not likely to be used extensively in this country for some time to come. Furthermore the waste oil and salt water escaping from the wells is often a source of serious injury to growing crops. After the productive life of a field has passed and the derricks, pumping apparatus, tanks and other accompaniments have been removed, agriculture regains, gradually, its former importance, but the recovery is apt to be slow.

Summary

With the discovery and exploitation of an oil field there are associated a number of phenomena which may be interpreted as responses to oil as a factor of geographic environment. Chief among these responses may be mentioned:

1. The boom or rush which commonly follows the opening of the field and is accompanied by a strong gambling spirit with its usual train of consequences.

2. Characteristic cultural features among which the most important are included under the items of working equipment such as derricks, pumping houses, rods and jacks, tanks, pipelines, etc.

3. The scant permanent population attracted by oil as compared with other mineral resources such as coal, iron, or zinc.

4. The demoralization of agriculture.

5. More or less well defined psychological effects.

At the basis of these responses seem to lie the following facts concerning the nature and distribution of oil:

1. It lies buried out of sight within the earth.

2. Its mode of accumulation is such that its distribution is often patchy and difficult to predict.

3. The two preceding features introduce a strong element of uncertainty and risk into its development.

4. It is a liquid—a fact which introduces many special features into the method of handling it.

5. It frequently requires to be pumped from the wells.

6. It has a high value and at the same time may, under favorable circumstances, be secured at comparatively little expense—hence the lure of easily acquired wealth.

CORN AND HAY

By M. Frances Warren
Mt. Pleasant, Michigan

BY a study of maps and charts, and year book, locate the distribution of the corn region in the United States. Make a study of the surface to get drainage, slope, and soils necessary for successful corn raising.

2. Study maps showing distribution of rainfall during growing-season—also charts showing probable killing frosts in spring—and first killing frost in fall (very important) also average summer temperature (all this to know climate needed to raise corn successfully).

3. Sum up the geography of corn growing, as to location, surface, and climate. Compare with conditions necessary for successful wheat raising (the study of the wheat industry came before this work on corn). Study latest year book to find maximum production in United States by states—as a whole—in other countries—Russia, India, etc.

4. Human factors entering in:

Education as to seed that will yield the largest returns as to quantity and quality.

Best soil preparation. Best method of planting, cultivation, and harvesting.

Adequate and efficient labor. Capital invested in above. Adequate transportation of corn.

5. Compare above with that of other countries.

6. Uses of corn: Locate the distillery centers of the United States. Why so located?

Canning and by-products. Feeding by silage. Feeding by grain.

7. Markets of demand for corn.

8. Study maps showing number of hogs per square mile in the corn belt. What conclusions do you draw? Locate the centers of the meat-packing industry in the United States. Why in the corn belt? (In the region of supply—saves transportation of raw product—near markets of demand—adequate and efficient (refrigerator cars) transportation of meat and meat by-products.

By-products of swine, lard, sausage, etc.

9. Our export trade in pork, and by-products.

10. Uses of hay: Rotation of crops. Feeding.

11. By a study of charts, maps, year book, locate the region where hay is an important crop. Name other grains raised in this region. Their uses. Discuss hay-raising and alfalfa-raising farther west as to surface conditions, climate, cultivation and harvesting.

12. Study the maps and charts showing number of cattle per square mile in the corn belt and the hay and alfalfa region farther west. What conclusions do you draw?

Compare with cattle industry of other countries.

13. Problems: 1. Why are we exporting less corn each year?

2. Why is meat so much more expensive than it was 20 years ago?

14. Cattle raised for two purposes: Meat and Dairying.

15. Beef cattle.

Locate regions in the United States where raising cattle is an important industry. Compare size of ranches now with those years ago. Compare care and feeding now with years ago. Compare density of population in regions of demand for beef and veal with those same regions 20 years ago. Carefully bring out these points:

a. Decrease of size of grazing region—greater demand for grain feeding.
b. Agriculture crowding out grazing region also.
c. Increased population—increased demand for meat.
d. Demand for young meat increasing.
e. Increased cost of land and grain.
f. Labor problem.
g. Demand for better care of cattle—government inspection.
h. Cost of better transportation—better, more careful methods used now.

What conclusions do you draw? 2. Which help to solve the problems? Give the solutions.

Locate the meat packing centers of the United States. Give reasons why this is such an important industry in these cities—Chicago, Kansas City, Kansas; South Omaha, Neb.; St. Joseph, Mo.; Indianapolis.

a. Nearness to region of supply.
b. Adequate transportation, from region of supply to these cities —care on trip there.
c. Adequate labor.
d. Within reach of capital to invest.
e. Near markets of demand.
f. Adequate transportation to these markets (refrigerator cars, quick transportation).

Discuss large stockyards, care of cattle while there, slaughtering, use made of every part of animal (by-products). How does the above add to the solution of your problems?

Discuss value of refrigerator cars in shipping meat to home markets—refrigeration in exporting. Countries to whom we ship meat. Compare our industry (beef cattle) with that of Argentina, and other countries. Routes of transportation abroad.

16. Dairying Industry.

Problems: 1. Why have substitutes for dairy products become so important, and so widely used? 2. Locate other parts, than the ones now intensively used, that will be used in the near future for cattle used in dairying industry.

Discuss the great importance of the dairy industry in the United States. The milk problem of the great cities today. Locate centers of this industry. Why necessarily near these cities? Why passing farther west? How does New York state rank? Wisconsin?

How does the care of cattle differ from years ago? Increased cost of feeding cattle. Housing of cattle at increased cost—modern barns. Great difference in dairying processes. Importance of new inventions—1. separator. 2. Babcock tester (to measure amount of butter fat in milk).

Need of decreasing the *number* of dairy cows, but increasing the *best* producers.

Discuss the increased amount of milk daily by certain feeding. Food values.

Dairying industry greatly influenced by markets. Locate these markets of dense population where there is a great demand for milk, butter, and cheese. Effect of milk refrigeration upon distance of milk routes. Distance that milk can be carried at same price. Value of quick, cheap transportation.

From the above, account for the increased cost of production of dairy products to the farmer—to the buyer. What substitutes may be used instead of dairy products? Compare the cost of these with the dairy products. What

conclusion do you draw as to their use instead of dairy products? What solution would you give to the problem?

If a new invention is a success in which, by the use of electricity, milk is prevented from spoiling for a greater length of time, from what distant states in our country can we obtain fresh milk? Why from Texas? How far does this aid in the solution of your problem? Locate another region. Discuss the possibilities of the southern states—of the New England states in this industry, in regard to your problem.

Discuss dairying in other countries—Switzerland, Germany, etc. Compare with United States. World value. From what countries do we import cheese? Trace routes of travel for this. Ports.

Other world needs are taken up and studied in much the same way.

Materials used in this work: Corn products exhibit, dairy products exhibit, many pictures.

Reference books: Robinson's "Commercial Geography." Salisbury, Barrows, and Tower's "Elements of Geography." Smith's "Industrial and Commercial Geography." Adams' "Commercial Geography." Chisholm's "Commercial Geography." Keller & Bishop's Book for Grammar Grade Children. Carpenter's "How the World is Fed." Allen's "Industrial Studies in the United States." Year Book for 1913.

CURRENT GEOGRAPHICAL NOTES.

Conservation of the Potato Crop in Germany

Germany's import of cereals is greatly curtailed by the prohibition of cereal exportation from some of the neutral countries, as well as by the danger of seizure as contraband when transported from non-contiguous territory. As a result the Empire must depend to a greater extent than usual on its own resources.

This matter has already been brought by various announcements to the attention of the farmers and the general public. More intensive farming, if such be possible, has been planned, as well as greater care in the conservation of products hitherto considered as waste material. For example, potato peelings and beet heads are now retained in the country or even collected in the cities and returned to the farm to be used as cattle feed. While the potato crop has always been an important factor in the food supply of the Empire, special efforts are being made this year to further its conservation. Fortunately, the crop is an abundant one.

In normal times, on an average from 3,000,000 to 4,000,000 tons of potatoes rot because of their large water content. Efforts have been made in the past to avoid this waste by the erection of drying plants, and Germany has had for some time quite a number of these institutions. Because of the present dependence on its own resources, it has been deemed necessary greatly to increase their number. For the sale of dry potatoes, a large syndicate is to be

formed, to which the factory owners are pledged to deliver all their products except what they need for their own use.

The content of water which normally amounts to approximately 70 per cent, can not be more than 15 per cent in the dried product.

The sale of the produce should be excellent, in view of the scarcity of cattle feed. It should increase correspondingly with the consumption of potato flour for baking. Many bakers have already made bread with an addition of from 10 to 20 per cent of potato flour, of which half was made from dried potatoes. In view of the fact that potato flour is about 8 marks ($1.90) per 100 kilos (220.46 pounds) cheaper than rye flour, this should tend to lower the price of this necessary food product.

A further considerable conservation of both potatoes and cereals for food purposes has been effected by the decision of the Government to cut down the production of alcohol by 40 per cent.—[*Daily Consular and Trade Reports*, Dec. 1, 1914].

The Cape Cod Canal

Cape Cod is known as the graveyard of sailormen. For 2½ centuries Cape Cod has been an obstacle in our Atlantic coast-wise traffic. Millions of dollars worth of ships and cargoes have been lost on the banks, shoals, and rocks near Cape Cod. During the last half century there have been 2000 shipwrecks on and very near this cape, with loss of 700 lives, and annual loss of half a million dollars' worth of property. By means of the Cape Cod Canal, which connects Buzzards Bay and Cape Cod Bay, such dangers can be avoided to a very great extent. This sea-level canal, which has converted Cape Cod into an island, is 7½ to 8 miles long, plus 5 miles of approach channels. The maximum height of the peninsula is only 29 feet. The canal has a minimum bottom width of 100 feet and a twenty-foot depth of water, which is to be increased to twenty-five feet immediately. Such dimensions may seem small because we are used to hearing figures which relate to the Panama Canal, but nevertheless the Cape Cod Canal is very high in rank because (1) dangers which have caused so many wrecks in the past can easily be avoided by way of the canal; (2) the distance between Boston and southern ports is reduced by 62 to 73 miles; (3) the cost of transportation is reduced by amounts ranging from 7 to 12 cents per ton, and the rate of insurance is cut from 12% to 4%; (4) the prospective annual tonnage is 25,000,000, where as that of the Suez Canal is 20,000,000, the estimate for the Panama Canal is only 10,600,000 and for the Erie Canal about 4,000,000; (5) the Cape Cod Canal has high value to our navy for strategic purposes. The $12,000,000 which the canal cost was furnished chiefly by August Belmont and associates. There was no government assistance. The work was completed in 5 years and the canal opened July 29, 1914. [References to literature on the subject: J. W. Miller, *Cape Cod and its Canal*, Board of Trade, Sandwich, Mass.; Mrs. C. R. Miller, Leslie's Weekly, July 2, 1914; The Literary Digest, Aug. 1, 1914; *The Opening of the Cape Cod Canal*,

Bull. Amer. Geog. Soc., Vol. 46, 1914, pp. 832-834; *Cape Cod Canal Nears Completion,* Technical World, Vol. 22, 1914, pp. 56-58; *Conquest of Cape Cod,* Harpers Weekly, Vol. 53, 1909, p. 13; *New Canal and old Cape Cod,* Harpers Weekly, Vol. 42, 1908, p. 16]. —M. K. Davis.

The Loess Soils of Southwestern Ohio

In the southwestern part of Ohio, including most of Hamilton, Clermont, and Brown counties, the northwestern part of Adams county, the southwestern portion of Clinton county and the southeastern part of Warren county, is found an area of soil different from that found in any other section of the state. Except in the valleys and on some of the slopes, all the soils have been formed from a silty layer known geologically as the "loess."

The loess is believed to consist of glacial rock flour ground up by the action of the ice, carried southward by the waters resulting from the melting of the ice, deposited in the valleys, and afterward swept on to the uplands by the action of the wind. In this way a layer, with an average thickness of about 5 feet, was deposited over the uplands in the southwestern portion of the state. It is from this layer that the loess soils of southwestern Ohio have been formed.

When laid down by the wind, the deposit of loess was doubtless very uniform in character and, if the drainage conditions had been the same over the entire section, only one kind of soil would have been formed from the loess. However, a difference in drainage conditions, with the consequent difference in the processes of weathering, has given rise to two distinctly different types of loess soils with all stages of gradation between them. Where the surface is sufficiently rolling to permit the water to run off rather rapidly after rains, the soil is a yellow brown color and had been called the Cincinnati silt loam; but, where the surface is level and water remains after rains until most of it is removed by evaporation, the soil has become a very light gray to white in color and has been called the Clermont silt loam.—[*Ohio Agric. Exp. Sta.,* Circular No. 146].

The Monsoons, and Navigation Near Ceylon

At "Adam's Bridge," where the island of Ceylon is close to India, a railway has now been completed which crosses all but one small gap. In order that the ferryboats may keep to the leeward side of the peninsulas and islets which go by the name of "Adam's Bridge," it is necessary to shift from the northern to the southern waters with the shifting from the summer monsoon to the winter monsoon.—[*Scientific American Supplement,* p. 136, Aug. 29, 1914].

GEOGRAPHY IN THE PERIODICALS

Mr. D. W. Strayer discusses "Second Term Geography for City Schools" in *School Science and Mathematics* for November (Vol. 14, 1914, pp. 704-710).

American Education for September, 1914, contains a set of Regents' questions on geography, as given in an examination in June, 1914. There are 14 questions and the correct answers are printed in full.

The relationships of the French forests in the war zone to the conduct of the present campaigns is described in most interesting style by S. T. Dana in Volume 20 of *American Forestry*, November, 1914, pp. 769-785.

By good fortune the National Geographic Society had planned for, and published in the August number of its magazine, a large colored map, showing the new boundaries of the Balkan States. This excellent map, by Bartholomew of Edinburgh, happens to cover all of central Europe and the war zone of every campaign except that in Armenia. The *National Geographic Magazine* for September, October, November, and December has many good photographs of scenes and people in France, Belgium, Germany, Hungary, England, Russia, and Turkey.

The *Boston Transcript* for Nov. 25 contains an excellent description of the geography of the Masurian Lake District in East Prussia by Prof. E. H. Babbitt of Tufts College.

The *Chicago Sunday Tribune* for Nov. 1st contained a red outline map of Europe with a black and white overprint of the United States on the same scale, showing graphically the comparative sizes and distances of places in the war zone. It should have been acknowledged that the article on "The Russian Campaign in Germany and Austria," which we published in the *Journal of Geography* for December, was reprinted from the Chicago Sunday Tribune of Nov. 22.

The *American Review of Reviews* for November has an article on "The European Food Situation," by Prof. T. N. Carver of Harvard University, illustrated with the 5 maps by Mr. V. C. Finch of the University of Wisconsin which were reprinted in the *Journal of Geography* for December and the *Literary Digest* for Dec. 5.

The Autumn Number of the *Geographical Teacher* (Vol. VII, Part 6, 1914) continues the discussion of "Agricultural Geography of England on a Regional Basis," the present paper dealing with Yorkshire. In the same magazine are lists and descriptions of maps of the theatres of war (pp. 410-417), and two effective diagrams showing the preeminence of London over Liverpool among English ports in 1912 imports, and the reverse for exports, (pp. 397 and 400).

In the *Scottish Geographical Magazine* for December, Rev. J. Bryant describes the resources and history of the colonial possessions of Germany in the Pacific (pp. 643-644).

The *Geographical Journal* for October contains an article entitled "Some Rough War Notes" by Prof. L. W. Lyde, and an excellent list of maps of the seat of war.

The *World's Work*, which is always one of the very best geographical magazines published in the United States, devotes a large part of its December issue to the effect of the war on the Americas, and incidentally produces

one of the best treatments of certain phases of the commercial geography of South America now in print. Especially commendable are the diagrams showing the ratio of production of food-stuffs and manufactures in the United States to the small portion exported (p. 178); the imports of Latin-America and of the Orient and the portion supplied by the United States, the world's exports, and exports of the United States (p. 179); the factors in United States export trade (p. 180); and the 8 maps showing what South American countries export and where it goes (pp. 149-150).

Mr. O. W. Freeman contributes a study of the geographic factors influencing the State of Montana to the *Bulletin of the Geographical Society of Philadelphia* for October.

Prof. G. B. Roorbach has conducted a symposium on The Trend of Modern Geography, the results being published in the *Bulletin of the American Geographical Society* for November.

The *Scientific American* for Dec. 5th takes up "Climatic Factors in the European Struggle" stating among other things (p. 461) that the western theatre of war in Flanders has the climate of South Carolina, while the eastern, in Poland, has that of Iowa.

RECENT PUBLICATIONS.

THE QUATERNARY ICE AGE. By W. B. Wright. xxiv+464 pages. Macmillan & Company, London, 1914. $5.00.

Mr. Wright, who is a member of the Geological Survey of Ireland, has written the best general book on glacial features in Europe and America which has been produced during the present decade, and one which most colleges, normal schools, and good-sized high schools will need to add to their libraries. Its language is clear, its arrangement is attractive, every halftone and diagram and map is exceptionally fine and well-executed. The treatment is judicious, the auguments are marshalled but not lashed, and the conclusions are generally acceptable. It differs from many books published abroad in giving much space to the glacial geology of the United States. One reads with interest of glaciers and ice sheets, of drift deposits, and of the glaciation of the British Isles and the immediately-preglacial deposits there. The written proof of preglacial age of certain raised beaches in the British Isles is well reinforced by remarkable photographs and diagrams showing drift lying on old rock benches and against ancient sea cliffs. The history of the continental glacier in Europe from the Baltic center, and of the ancient glaciers in the Alps and in North America is followed by a good description of Lakes Bonneville and Lahontan and of the loess. After describing the Quaternary mammals and the relics of interglacial man, the author summarizes the theories of the cause of the Ice Age, and gives a resume of the Scandinavian oscillations of sea level in Quaternary time. The raised beaches of the British Isles, the warped shorelines of the Glacial Great Lakes in America, an isostatic theory of the changes of level of the land, and a review of postglacial changes

of climate in northwestern Europe round out this long-needed and highly-successful work.

THROUGH THE GRAND CANYON FROM WYOMING TO MEXICO. By E. L. Kolb. xi+344 pages. The Macmillan Company, New York, 1914. $2.00.

A straight-forward narrative of the journey of the Kolb brothers through the Grand Canyon of the Colorado in 1911. They tell of their adventures in following Major Powell's route, equipped with cameras and moving-picture machines, of what they saw and did and how they felt. The photographs are a little disappointing in view of the fact that these particular travellers make it their business to take pictures and were passing through the most wonderful work of nature; but there are one or two striking views, and the book contains enough geography and enough information about this wonderful canyon to make it well worth reading by any American.

ENGLISH INDUSTRIES OF THE MIDDLE AGES. By L. F. Salzmann, xi+260 pages. Constable & Company, London, 1913. $2.00.

An introduction to the industrial history of mediaeval England. No teacher or student of commercial geography can fail to profit from reading of mining and use of coal in England by contemporaries of Queen Elizabeth, of the use of iron from the Stone Age to the Seventeenth Century, and so on with the other mineral resources. Doubt is cast upon the identification of Devonshire-Cornwall as the source of the tin of the Phoenicians 500 years before Christ. Not a few geographical points are to be gleaned from the Salzmann's discussion of clothmaking, leather working, and brewing in the England of the Middle Ages.

WAVES OF SAND AND SNOW AND THE EDDIES WHICH MAKE THEM. By Vaughan Cornish. 383 pages. The Open Court Publishing Company, Chicago, 1914. $2.50.

We have many books on the work of glaciers, but few on the work of the wind. Yet the glaciated area in northeastern United States is not much larger than the arid and desert area in the Southwest. Another book on the eolian processes in relation to waves of sand is especially to be welcomed in America. Mr. Cornish has described and explained dunes, ripple marks, etc., in a well-illustrated volume.

THE ANTIQUITY OF MAN IN EUROPE. By James Geikie, xx+328 pages. D. Van Nostrand Company, New York, 1914. $3.00.

The description of the Glacial Period in Europe and the discussion of the antiquity of man on the continent are inseparably linked. There is no author so familiar with both topics and so eminent in both fields as Professor James Geikie.

There are no less than seven archaeological stages which precede the well-known Iron Age, Bronze Age, and Neolithic. In the earliest of these Paleolithic periods—the Chellean—the earliest man is known. The Chellean

comes in the second of the mild interglacial epochs. The testimony of the Pleistocene plants and animals, of cave deposits, river deposits, and glacial deposits, all point to the conclusion that man has lived in Europe for thousands of years, and perhaps for 2500 to 5000 centuries. The book contains an excellent summary of the glacial geology of Europe. It is illustrated by drawings and diagrams, and by superb halftones, and contains four colored maps which are new. These show the continent at various stages of glaciation.

THE REPUBLICS OF SOUTH AND CENTRAL AMERICA, Their Resources, Industries, Sociology and Future. By C. Reginald Enock, 544 pages, Charles Scribner's Sons, New York, 1913. $3.00.

This book may well be used as a text in colleges and it is a splendid reference book for the teacher of geography. It is interesting and full of the kind of information that the student of South American conditions desires. A chapter is given to Mexico and to each of the important countries of South America. Separate chapters are devoted to General Relationships, the Amazon Valley, the Aztecs, the Incas, Foreign Relations, Colonization and Commerce, and to Sociology and Future. The second paragraph of Chapter IV reads: "The great estuary of La Plata must be regarded as the commercial and maritime navel of South America. Towards this great inlet swarms of immigrants of the Latin race from the Old World have taken their way, and from it issues great store of food products of meat and corn, as if in the nature of compensation and return freight for the human cargo brought from Europe. The republic of Argentina, and to a much lesser extent Uruguay and Paraguay, together with a portion of Brazil, have as their physical basis the wide-spreading territory of the great pampas; the alluvial food-producing plains which are in some respects the principal and most valuable topographical and economic feature of South America; traversed by the great rivers which have their outlet in the estuary of the River Plate."

In a similar entertaining manner the author discusses the topography, soils, industries, commerce, government, people, education, amusements, political divisions, history, and future of Argentina. Buenos Aires is described very fully and some consideration is given to other cities. Each of the Republics is treated in like manner. F. E. WILLIAMS.

FIRST YEAR SCIENCE. By William H. Snyder, xvii+460 pages. Allyn and Bacon, Boston, 1914. $1.25.

This text, as stated in the preface "is the outgrowth of the effort of a committee of the Los Angeles teachers to make a simple, unified course in General Science for the upper grades of the intermediate schools and the first year of the high school."

"*First Year Science* deals with the earth and the sun in their relations to man." This sounds very much like a definition of physiography, in spite of the fact that "All subjects of elementary school science—physics, physiography, forestry and agriculture—are treated." The table of contents shows that

fully four-fifths of the subject matter is such as is found in the ordinary physiography. The book is interestingly written, in language that the first year high school student can understand. The illustrations are good. At the close of each chapter is a short summary and a list of questions. The distinctive feature of the book, however, is the experiments, 131 in number. These require but the simplest apparatus, and the directions are so interestingly worded that even a grown-up feels that he should like to perform them.

If this book is a fair sample of what First Year Science is like, that subject will make a most satisfactory substitute for physiography. Mr. Snyder has made the subject both interesting and practical. E. F. BEAN.

ELEMENTS OF GENERAL SCIENCE. By Otis W. Caldwell and William Lewis Eikenberry, xiv+308 pages, Ginn & Company, Boston, 1914. $1.00.

As a result of their six years' experimental work, in general science, in the first year of the University High School at the University of Chicago, the authors have produced a textbook of General Science which will have a decided effect in determining the future status of the subject. In solving the great problem of every teacher of elementary science, first the choice of material to be presented and, secondly its organization so as to secure unity and logical arrangement of topics, the authors state that they have chosen "a topical organization of those science materials which pertain to the home, school and community environment. In this organization little or no attention is given to the boundaries of the different sciences, each science being used as it is needed for a consideration of the topics selected. The unity which should be present in any science course is secured through the unity of the topics and not through the unity of any one differentiated science. The topics treated fall readily under five headings: I. The Air; II. Principally about Water; III. Work and Energy; IV. The Earth's Crust; V. Life upon the Earth." E. L. JAY.

TEACHING THE GEOGRAPHY OF THE WAR

Some schools collect newspaper maps and date them, but the lucid and inexpensive war maps of the London *Times* should and could easily be in every school. Liege, Brussels, Louvain, Antwerp, Verdun, Metz, Epernay, Alsace and Lorraine, the rivers involved, from the Rhine to the Meuse and Marne, and in the East, Warsaw, Cracow, Konigsberg, and many more can be located and to older classes something can easily be taught, with the aid of Baedeker, of each of these places as they become centers of interest; and the same is true of Servia, Galicia, Constantinople, the Balkan States, the Black Sea, boundaries between the different countries, why Germany, Austria and Russia feel shut in, and what they want, the Bagdad and trans-Caspian railroads, Salonica, the short land routes to India, the interests of each country in Asia and Africa—such things and many more can now be taught with no partisanship and without great difficulty and with great interest.—[G. Stanley Hall in the first number of *School and Society*.]

The JOURNAL of GEOGRAPHY

Volume XIII MARCH 1915 Number 7

WHAT SHOULD ELEMENTARY SCHOOL GEOGRAPHY INCLUDE AND IN WHAT ORDER SHOULD ITS MATERIALS BE PRESENTED?

By H. W. Fairbanks
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WHAT is geography and what part ought it to play in elementary school education are questions to which many diverse answers have been given.

In looking through files of the Journal of Geography as well as various reports and discussions on the teaching of geography we do not find any uniformity of opinion as to the fundamental nature of the subject, as to what it should include in the elementary school, or finally what should be the order and what the method used in the presentation of the material.

With the present unrest in educational matters, the cutting down of the time allotted to various subjects and the throwing out of much that has encumbered the curriculum, what is finally allowed to remain must be shown to be a fundamental and necessary part of the child's education.

The position of geography has been a difficult one. It has suffered much at the hands of both friends and foes. It has been criticized by those who should know better as being merely an agglomeration of facts from every science and without any individuality of its own. It has often suffered at the hands of its friends through a lack on their part of an insight into its fundamental nature, and an inability to arrange and put in practice courses which should demonstrate the importance which they claim for the subject.

We must conclude that the tendency in many quarters to cut down the time given to geography indicates that the importance of the subject in the elementary school curriculum is not understood, and that the divergence of view point brought out in discussions shows that we have not yet arrived at an agreement as to what geography is or how it should be taught.

The literature on geographic topics in our journals abounds with many valuable contributions along the newer lines of thought, and if these were put in practice we could indeed say that the outlook was promising, but when we turn to the schools, to the methods employed and the texts which are accepted without any serious criticism, we cannot help but realize what a mighty gap there is between theory and practice in our educational system.

It is not customary to demand any special training of teachers of geography in the elementary schools and the subject still remains in most of them a mere memorizing of disconnected facts. The geographies in use show but little improvement over those of a generation ago, and the general absence of objections to their use lead us to conclude that the newer views have not

aroused any wide-spread response either among the teachers or among those who have the responsibility of organizing and putting in force the work of the elementary school.

The schools of Germany have long been noted for their excellence in many respects and their methods have been widely copied in other countries. The doctrines of Herbart, Ritter and others as applied to school geography have found a practical expression in the teaching of the subject and in the text-books which place them far in advance of the teaching and of the texts employed in any other country.

In what follows I shall give briefly a number of views as to what geography is, what should be included in a course in school geography, what is the best order of presentation and what methods should be used. These are presented with the hope that they may help advance a subject which it seems to me is one of the most important in the curriculum but which is today not receiving the attention which it demands, and concerning the exact nature of which most teachers have a very hazy idea.

A definition so commonly used that it has become trite is as follows: "geography is a study of the earth and man" or in little different form "a study of the earth as the home of man." These definitions are so brief and inadequate that they fail to convey any real conception of the subject, in fact they convey a wrong one. In the first, *earth* and *man* as the two important parts of the subject are singled out for mention without giving any clue as to the relation they bear to each other or if there is any relation at all between them. We have no idea as to whether the term "earth" includes merely the physical earth or the various forms of life as well.

The second definition is equally defective in that it fails to give any clue as to the nature of the study. Man is singled out for mention as though he were outside of the subject and not an integral part. In a rational definition we should no more expect to find man specifically mentioned than any other animal, for he is included as an inseparable part from the very nature of the subject.

The definition given by Mill that "Geography is the exact and organized knowledge of the distribution of phenomena on the surface of the earth, culminating in the explanation of the interaction of Man with his terrestrial environment,"* is also open to criticism. The idea of "distribution" is not the controlling one in modern geography, and particularly of elementary school geography. Man is a part of the phenomena of the earth's surface and it is wholly superfluous to single him out for especial mention in a definition of the subject. By so doing we seem to set him off against the rest of nature in a class by himself a proceeding which does not give the right point of view.

McMurry has voiced a much more comprehensive definition when he says speaking of geography: "It deals with people in the midst of their physical

*Mill—Realm of Nature, p. 331.

social, industrial, and political surroundings."* It is not clear, however, what the point of view is. The statement might be interpreted as a mere enumeration of facts about any given group of people with no attempt to bring out the innate relationship which exists between all these facts, a relationship which constitutes the true essence of modern geography.

McMurry says in another place‡: "The study of the earth alone, its phenomena and forces, its vegetation and animals, its rocks and atmosphere, is natural science pure and simple." It seems to me that this is a fundamentally wrong conception of geography. There is just as truly a science of geography in the study of the distribution of animals, and the effect of environment upon their habits, structure and coloring, as there is of man in relation to his environment. The study of the distribution and modification of vegetable forms over the surface of the earth is true geography, although we may conceive of its being carried into regions where man does not or cannot live.

Bryce says: "Geography is a sort of great culture hall from which there opens out numerous doors, leading into apartments, each of these being dedicated to some particular one of the sciences.—All branches of knowledge which have anything to do with the earth, diverge from or are connected with geography.—Geography is the science which brings all into correlation with each other; it is the science through which you can best observe the action of each of them upon the life of man."

Guyot says geography is "the reciprocal action of all those forces the perpetual play of which constitutes what might be called the life of the globe; it should, if I may venture to say so, take up its physiology." In this definition, as far as I have been able to learn, is the first suggestion of the views advanced by Fritsche, a modern German geographer, that geography is the study of the earth as an organism. This definition given by Guyot is, it seems to me, one of the very best that has ever appeared. It gives a true conception of the province of modern geography.

The author has in another publication given the following definition—"Geography is the science of the earth as an organic whole whose parts are continually reacting upon each other"**; and again, "Geography is a study of the earth as a living organism whose parts and functions are mutually dependent." By earth is here meant the totality of the phenomena exhibited upon its surface studied in the light of their interdependence. In the definition of Guyot as well as that just given there is no occasion for singling out "man." As one of the earth phenomena he is included in the definition.

It may be said in criticism of the position outlined above that the definitions deal with the subject as a science and not from the standpoint of the schools. It should be recognized, however, that we must have clear conceptions to start with. The general lack of clean cut conceptions as to the funda-

*McMurry—Special Method in Geography.
‡McMurry—Special Method in Geography, p. 8.
**Nature Study Review, September, 1905.

mental nature of geography is the cause of much of the confusion in the elementary schools in regard to what should be included in geography and how its facts should be presented.

One of the foremost German geography teachers is Fritsche who in his paper "Die neuen Bahnen des Erdkundlichen Unterrichts," has presented a discussion on elementary geography which is the best the writer has ever seen. He looks at the subject from the standpoint of Guyot. He says—"The earth in its collective phenomena is an organism well knit together, which, like an animal or plant is continually going through changes." Fritsche has embodied his views in a series of most excellent geographies for the elementary schools.

Geography in the elementary schools should be first a study of the phenomena of the environment in their association and mutual relationship. Any fact which is studied for its own sake, because of its own intrinsic value apart from its relation to other facts cannot properly be included in the geography course, although it may be expedient at times to place them there. As the study is extended outward from the home this fundamental idea of the world as an organism forms a philosophical basis for a unity of treatment and a criterion by which we can exclude what is foreign.

Geography is not the study of the earth and man, but of an earth on which man plays his part, although an important one, in a unity of all phenomena. It is the province of science to analyze this organism and to study its parts; to dissect it and find the nature of its parts. For the child the important thing is the study of the living organism with all its parts functioning, and this is what constitutes geography.

The child does not look at himself as outside of nature but as a part of it. People and their industries, animals, birds, the solid land, the sea, the sky, hills, streams, etc., form one world of which he is a part. To learn how all these things affect each other, first in the place where he lives and then in other parts of the world, is the object and aim of his studies in geography.

We now come to a discussion of the order in which the materials of geography should be taken up. Most geographers hold that the subject should at first be perceptive. The pupil should become acquainted with and able to interpret the facts of his environment, and using this sense experience as a basis build up by the aid of descriptions, pictures and maps an understanding of other regions. This is so commonly accepted in theory that it needs little discussion here, but as a matter of actual practice in the schools of our country the time and attention given to the home region is usually absurdly inadequate. This is a relic of the older geography which was purely descriptive and in which the home had no place.

The fact that teachers are still generally untrained in the methods of home geography, and are thus unable to interpret and make use of the simple geographic materials of their environment has, together with the text-books

in use, greatly retarded the application of the newer views so generally held by those who have given the matter careful attention.

The school texts while introducing some material called home geography, which is of necessity very general in its character, adhere on the whole to the older order of topics. No matter in what part of the country a child's home may be he finds the subject developed in the same order. He is taken from New England down the Atlantic coast, through the southern, central and finally the Pacific coast states. If his home is in California the chances are that it will be slighted until after he has been over the whole circuit of our country. He not only knows little about his home which is to him the most important place in the world, but he has no foundation on which to build an understanding of lands which he has not seen.

There is not a single geography text in use in our country which has been written to meet the needs of the children of any particular section. The books are made to sell in any part of the country and thus no part receives the emphasis which it needs.

It is true that an attempt has been made to remedy this defect by the publication of state supplements. As far as the writer is aware not one of these gives anywhere near the amount of time to the home district or state that its importance demands. The state supplement does not fit in with the rest of the text and is the poorest excuse ever devised to help out our inadequate system.

With the small amount of knowledge of home geography on the part of the average teacher, the lack of any encouragement from the books in use, looking toward a more rational system, and the indifference on the part of superintendents, it is no wonder that the pupil, though he spends a large amount of time on the subject in the elementary school, goes out into life with the haziest ideas of the conditions under which he lives. He has acquired a lot of poorly digested facts about the countries of the world, which, because they are based on memory alone, and have not been worked out upon a basis of sense experience in his home region, are bound soon to fade from his mind.

It is instructive to learn how differently the geography of the home and native country is treated in the best German schools. In those of Munich, for example, observational or perceptive instruction occupies the first two years. Heimatkunde or home lore fills the third and fourth year, while geography as a formal subject begins in the fifth. The heimatkunde of these years corresponds in part to our home geography and in part to nature study.

The fifth year, except for a short general survey of the world, is wholly given to Germany. The sixth takes up Europe and the seventh the rest of the world. In the eighth year the pupils are brought back again to the Fatherland and study its commercial geography. Thus out of a total of six years, four years are devoted to the home land. All the work in geography is built around the home and Fatherland and the relation of these to other parts of

the world. The German child has impressed upon him in the most thorough manner the importance of his native land.

Anton Jahr has given in the Journal of Geography an outline of the course of geography in the Leipzig schools.* It is much the same as that in Munich. It starts with the home and gives the same intensive study to the province and native country, but the study of the earth as a globe is left until the seventh year when the pupils can better understand it.

The writer has long held that the formal study of the globe and the distribution of the main features of the earth's surface in the third or fourth year is wholly out of place at this stage. The pupil is not mentally able to grasp these relations in such a manner as to do him any good. It is sufficient that he acquire a general idea so as to be able to orient himself. Stories and descriptions of people and places in other parts, and how these are situated with reference to his home will accomplish this.

Most German schools give the third and fourth years to heimatkunde. Then follows the formal text-book work. The geographies published by Tischendorf are in five parts, of which three are devoted to Germany. The first part embracing about 300 pages is given entirely to Saxony, one of the smallest German states.

Prull gives one third of the space in his *Methodisches Handbuch* to Germany. Fritsche, whose books it seems to the writer are the best of any in the German schools, emphasizes the home land in the same manner.

In an extended article in the German Pedagogical Magazine entitled "New Paths in Geography Teaching", Fritsche while criticising certain practices in geography teaching in his own country, says, "He who thinks he can reach this high mark (speaking of culture) if he takes his children three years into foreign countries and has only one year for the observation of the Fatherland makes a great mistake and has wholly forgotten the purpose of the German folk schools."

If our thesis is correct that the home and its interests as they reach out over the world are of the most importance, then a school in New England would require quite a different course in geography from one in the Mississippi Valley or upon the Pacific Coast.

If we accept the German estimate of the relative importance of the home and state we shall have to revise our courses of study radically, and in most cases more than double the time given to them.

In taking up the geography of the United States we should pay less attention to political boundaries and more to the natural geographic regions into which the country is divided. Such a region in which the home is situated should be studied in its entirety without regard to whether it corresponds to a county or state boundary. The idea of studying groups of states forming a

*Journal of Geography, May, 1911.

natural region instead of the old artificial one has been hardly more than suggested in any of our texts. Prull, the author of an excellent series of German books for the elementary schools has made the study of "natural geographic regions" the especial point of departure.

As to the manner of presentation of the facts of geography most of the work is still descriptive and based upon the memory, although the newer texts in our schools lay more or less emphasis upon the causal relation.

Fritsche, in the article already referred to, develops out of Ritter's comparative geography what he calls the "biologic method." This is not so essentially different from the more advanced ideas of some other school geographers but is more thoroughly and carefully worked out. Fritsche would pay less attention to the outward form of geographic phenomena and develop more clearly the idea of the inward relationship. Nothing exists by itself; each thing conditions others, and all together form the earth organism. He says the teacher must not pass on too quickly to generalizations when there has been an insufficient basis in observation. Each new point of view, each relationship worked out must be tied up with what has already become a part of experience. If this is not done the new facts will remain in the air as far as the pupil is concerned and never become a part of his real knowledge.

When we come to the maps in our textbooks and to our methods of map study we find again that the Germans are far ahead of us. The maps in all our school books are far from what they ought to be and in some they are so small and indistinct as to be almost worthless.

In our ordinary method of taking up map study we forget entirely that the symbols of the map mean no more to the pupil than the hieroglyphics of an unknown language. He must first be taught to interpret these upon a basis of actual reality.

Fritsche and other German teachers rightly insist that the study of maps is useless unless the pupil first knows the landscape represented in the map through actual observation. The map is not an image of the landscape, but consists of a variety of signs and symbols standing for it, and must be translated into the experience of the pupils. The map says there is a mountain here, a steep slope there, a gentle one farther along, a river here, there a plain, there a forest, etc. The pupil has no means of translating these symbols without first having made observations upon the real things. According to Fritsche this ability must be gained from excursions, from the study of pictures and from the stereopticon. Without this basis of perceptive experience it is impossible to acquire any real understanding of maps.

An important adjunct of the German texts is the atlas of which a great deal is made. It is bound in a volume by itself which practice has many things to recommend it. There are a number of German school atlases which for distinctness and beauty of coloring cannot be excelled. There is no reason why the maps put before our children should not be as attractive as these.

The older German texts had few pictures of value, but the new ones

contain many excellent half tones. It has also become customary to introduce a number of colored illustrations which with certain subjects are very effective.

In what has been said the writer has tried to point out what appear to be grave errors in the commonly accepted view of geography, as well as some fundamental defects in the text-books and the class room methods, with the hope that if his views are not accepted they will at least arouse a discussion which will help to clarify the situation.

THE EUROPEAN WINTER AND THE WAR*

By Robert DeC. Ward
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IT IS in the eastern war zone that there has been the greatest suffering on account of the cold, and it is there that the winter weather controls have been most marked, but the dispatches from this area have given us much less information on this point than have those from the Franco-Belgian zone.

From Galicia, with its high ground and its northern exposure, came, in mid-September, the first mention of the suffering of troops from the cold, and early in October the soldiers there were already marching and camping in the snow. The Russians, well protected by their heavy overcoats, suffered little discomfort, but the Austrians, whose winter clothing had been captured by the Russians in Lemberg, were less fortunate. In the northeast the Germans seem to have been surprised by the setting in of cold weather in the first half of October, and not having heavy clothing they suffered severely. The Russians, on the other hand, were well protected, having fur caps covering both their heads and necks, and being otherwise well equipped with requisites for a fall and winter campaign. After their early attempts to crush Russia were unsuccessful, the Germans prepared for winter fighting in Poland, for the troops which went to the front late in October were well equipped with fur gloves and sheepskin coats. The Germans seem to have suffered from the cold all along the eastern battle line. They commandeered all available colthing, furs, and sheepskins, and at Lodz the great cloth factories were kept working night and day to supply clothing.

In the matter of general tactics of the war, it is unlikely that the Germans, even if they had been distinctly victorious in the east, would have thought of penetrating far into Russia, to face, as did Napoleon, the might of Generals January and February. It is probable that the early German activity against Russia was at least in part due to the desire to gain a distinct advantage before the setting in of the rigorous Russian winter. The capture of Warsaw before winter would have greatly strengthened the German line in

* Continued from p. 171 of the February number of the *Journal of Geography*.

East Prussia, would have endangered the Russian frontier, and would have had a distinct moral effect on the Poles. Further, if a large body of German troops could then have been transferred to France, a new campaign against Paris might perhaps have been attempted during the milder French winter. Whatever may have been the other reasons for the Russian advance into Austrian Poland, it is clear that this southern route into Austrian and German territory would naturally offer certain important climatic advantages. One of the reasons why Italy has so long kept out of the war is believed, by at least one authority, to be due to her desire to avoid a winter campaign.

Toward the latter part of October snow was interfering with the offensive of the Russian army in Poland by delaying the movement of its supplies. The German and Austrian troops, therefore, retreated less rapidly and made a more determined resistance. They were, however, themselves greatly hampered by a breakdown of their own supply trains. In December, the whole German Polish campaign was practically at a standstill, owing to the mild weather, which impeded the movement of guns over the soft ground and favored Russian trench digging.

The weather of the eastern war zone has been the dominant control in the campaign throughout the winter. Every spell of mild weather has been accompanied by an immediate slackening of military operations, owing to the difficulty of transportation. Every cold spell has stimulated military movements. Whenever the curve of temperature has gone up the curve of military activity has gone down, and whenever the curve of temperature has gone down the curve of military activity has gone up. To follow these seesaws of weather and military operations in detail would be tedious and profitless at this time. In January the Germans were using ice breakers on the Masurian lakes in East Prussia to make it possible for their gunboats to remain effective and to prevent the Russians from crossing on the ice. As long as the rivers were open they afforded protection to the Russian troops who were on the defensive behind them, and prevented the Germans from crossing on the ice. Zero temperatures were reported at Galicia early in January, and many soldiers have been frozen to death. There is an interesting and welcome human touch in a dispatch that, in Poland, by mutual agreement, neither side fired on the men of the other who were carrying straw to make their winter quarters in the deep trenches more comfortable.

The Russians are more accustomed to severe cold than are the men from the west and south of Europe, and it was reasonable to expect that they would prosecute the war with little diminution of energy during the winter. They are splendid cold weather fighters. Their midwinter military maneuvers each year have taught them cold weather tactics. Von der Goltz also, when German commander in eastern Prussia a few years ago, conducted experimental winter maneuvers along the lines followed by the contending armies in the

campaign of 1806-07 in that region, a campaign the horrors of which Von der Goltz has himself depicted in his book, "Jena to Eylau."*

The most dramatic achievements of the winter thus far have been the marches of the Russian armies over the mountain passes of the Carpathians, deep in snow. Fighting among the spurs and in the passes of the Carpathians has been terrific, and carried on under extraordinary difficulties of severe cold, and bitter winds, and heavy snowstorms. Often the troops had to cross, waist deep, the icy waters of the mountain streams. The sufferings from frost bites and exhaustion are reported to have been terrible. When we hear of snow three to six feet deep in Serbia it is not difficult to understand why Austria tried to crush Serbia before winter came on.

In the French and Belgian war zone the advances and retreats have seemed more like the tactics of a football game than of a war. It is impossible to follow the details in the present discussion. It has been a seesaw of weather and military operations, much like that in the east. The "autumn chill" of the nights and early mornings of late September in the western war zone roused the commanders to a realization of what was coming. On all sides there were sudden preparations for winter. The German Crown Prince telegraphed to the Emperor for winter socks and underclothing for his men. Germany ordered sheepskin clothing and fur coats from Rotterdam. The French minister of war sent a circular to all the prefects requesting them to obtain, as rapidly as possible, supplies of woolen underclothes, socks, gloves, and blankets for the use of the French soldiers during the winter. England made special provision for her Indian troops in the way of mufflers and warm underwear; commandeered large quantities of woolen goods, and imported from this country rubber boots and cardigan jackets. From the United States the different nations have bought immense quantities of sweaters, woolen socks, gloves and underwear, blankets, paper vests, woolen boots, and millions of horseshoe calks. The fact that this war is being fought in the winter means hundreds of thousands of dollars to the manufacturers of winter supplies in the United States.

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*Petre, describing the night before the battle of Eylau, says: "It requires a strong effort of the imagination to picture the horrors of that night. The valley and the heights on either side, deeply buried in snow, were lit by the bivouac fires of 120,000 men. The flames flickered in the icy north wind which swept along the position, carrying with it the smoke from the damp wood and the constantly falling snow. Not even the pale light of all these hundreds of fires could impart warmth to this arctic scene. The men crowded round the fires for warmth, hardly for rest; for what rest was possible in such circumstances? Between the opposing lines of fires stood the outposts of the armies and the sentries, who, on their cheerless posts, must have thought with envy even of their companions behind them. The battle was fought in a winter tempest. The snow prevented the commanders from seeing their troops, the howling north wind rendered it impossible for the soldiers to hear the word of command. At times it was not possible to see ten yards off. The action at such moments had the character of a night attack." Von der Goltz says that the Russians were not allowed to have fires lest these should betray the position of the troops.

The cold and rain and snow and sleet brought by the winter storms have made life in the trenches desperately wretched. Standing or sitting in ice cold water or "half frozen slush," and trying in vain to keep reasonably dry and warm, the troops have suffered terribly. Frozen hands and feet, and deaths by freezing, have been reported from both sides. The snow and cold made it necessary to shift the men in the trenches oftener. There was a marked increase of illness, especially of throat and lung affections. Every device was resorted to to make life in the trenches more bearable. The bottoms of the trenches were covered with straw and brush; fires were built, for which coal and coke were supplied when possible; oil stoves and braziers were used; corrugated iron roofing, the doors of houses, and planks were put over the trenches, and interlacing branches of trees were made into a rough sort of wicker work to prevent the embankments from crumbling away. The troops protected themselves with blankets and waterproof sheets, and guarded against the cold by wearing sheets of paper under their uniforms. Dugouts were cut under the sides of the trenches for the men to sleep and take shelter in. These refuges were raised somewhat above the bottom of the trenches, so that they were dry in wet weather.

The difficulties encountered in trying to move heavy guns through the deep mud and "slush" of Flanders were often unsurmountable. When the heavy guns had to be abandoned, lighter ones were substituted. Moreover, the frequent changes in the weather caused serious trouble. A day of cold froze the ground and facilitated movements of the troops and supplies, but at the same time often interposed serious obstacles in the way of great stretches of ice, on which horses and motor trucks were useless. Thousands of men were engaged at such times in throwing earth over the ice to prevent interruption of the transportation of supplies. Then a few days of mild weather and of rain turned the roads and fields into quagmires again. Great efforts have been made by both sides to keep the roads in condition for motor traffic. In a French official statement issued Jan. 4 we read: "In general, the perceptible abatement which can be noted in our active offensive should be attributed to the incessant rains, which soak the ground and make operations everywhere almost impossible." Under such conditions food supplies could not be sent forward to the troops.

About mid-November a severe westerly storm, with rain and high winds, swept the waters of the North sea far inland through the big locks at Nieuport ,which had been opened in order that the German advance over the lowlands might be checked. Thus the heavy rains and high winds helped the allies. In some cases the Germans were absolutely cut off by the floods, and were reported as literally washed out of their trenches. Fighting in water was an every day affair, and when the men were completely exhausted with fighting and with the cold, and when the weather was at its worst, hostilities temporarily ceased.

The whole period from Jan. 5 to 15 was marked by wretched weather—rain, snow, wind, fog, and mud, and all operations slackened. The French retreat across the Aisne at one point about the middle of January was reported to have been due to the fact that bridges had been carried away by floods and the allies' lines of communication were endangered. In one dispatch it was reported that, although the allies were in a bad plight, they had the consolation of knowing that their enemies were in a worse plight, for the latter had the wind and rain in their faces. This was the rainy westerly wind, directly off the water. One advantage of the soft ground for the allies was that the German howitzer shells sank some depth before they detonated, and much of their energy was therefore spent upward, throwing the mud about. Washing and shaving were impossible in the trenches. Water bottles froze and had to be thawed out.

Foggy and misty weather has frequently played its part, hampering the action of artillery on land, and again and again caused a cessation of hostilities. As a curiously unexpected meteorological phenomenon came the report, Jan. 13, of a sandstorm in the dunes along the coast. In the last week of October snow fell in the Vosges in considerable amounts, and also at several points along the French frontier. By the middle of November temperatures below freezing were reported all along the western battle front. And early in December the advance guards in the passes of the Vosges were fighting in snow two feet deep in the rigorous climate of those mountains. Early in January the French Alpine troops charged down the slopes of the Vosges on skis and routed the enemy.

The French colonial troops, especially those from Africa, are stated to have been "benumbed by the cold." While, in general, the troops from warmer latitudes may be expected to suffer more from cold than those from farther north, there are many cases in history which contradict this expectation. When Napoleon went to Russia his French troops endured the cold better than did the Poles and North Germans. In the Balkan campaign of 1877 the Russians suffered more than the Turks. Over and over again men from colder climates have not proved themselves superior in prowess or endurance to the men from more genial latitudes. In the present war we should remember that the Gurkha Indian troops are essentially highlanders, and by no means incapacitated for hard marching and fighting in the cold.

There are many respects in which the weather is of more importance in warfare today than it ever was in the past. The use of searchlights and aeroplanes in directing ordnance fire, and the greatly increased mortality caused by modern artillery, make the protection of troops, in trenches or otherwise, of essential importance. A low cloud, a fog, a snowstorm, a heavy rain, may give just the protection needed and yet not interfere with the free movement of troops. In this very war the surrender of Namur was hastened by a heavy

fog, which enabled the Germans to plant their siege guns in a good position and without danger to themselves.

In the matter of aeroplanes and airships warfare is far more dependent on weather conditions than it ever was. It seems to be a fairly well established point that in order to have his reconnaissance of real value the observer in an aeroplane must, unless the weather is unusually clear, come down low enough to be in danger from gun and rifle fire. Fogs and low clouds obscure the surface from an aerial observer. Wind may wholly interfere with his work at a time when his report is most needed. The increasing numbers of London fogs with the coming on of autumn led to great anxiety in London on account of possible Zeppelin attacks. Tests were made at the end of September to ascertain whether searchlights can detect a Zeppelin even through a fog. A warning was issued by aviation experts to the effect that an attack on London was most likely on a clear, calm night. Foggy and misty weather, cold, and high winds have hampered aerial reconnaissance, but the aviators of both sides seem to have carried out successful work in spite of the winter storms. When, however, bright calm days have intervened between the stormy spells, the advantages for the aviators have always been mentioned in the dispatches. That the airmen have suffered from the cold is evident from the fact that they have been obliged to come down because of frozen feet and hands.

In the wintry gales over the channel and the North Sea England probably has had her most valuable ally against a general Zeppelin raid, but the intervals between storms may yet prove the Germans' opportunity. The German aeroplane which dropped a bomb over Dover in late December "escaped in the mist" from the British aeroplanes which pursued it. In the Christmas day aerial raid by the British upon Cuxhaven the atmosphere was so thick that it was difficult for the airmen to achieve their purpose. It is obvious that a fog gives aviators their best chance of safety, but, on the other hand, they cannot pick out their targets. In the German air raid of Jan. 19 a mist prevented the airmen from aiming their bombs with accuracy, and also prevented effective pursuit of and successful shooting at the invaders.

It is not difficult to realize how serious the lack of a daily European weather map must be in the whole aerial campaign. Germany in particular, if she plans a general Zeppelin raid on England, must find the lack of observations from the British Isles most serious. German meteorological observers followed the German army closely in Belgium, and meteorological stations were at once established at Brussels, Ostend, and Zeebrugge. These observers have doubtless been issuing local weather forecasts for the use of the military staff.

So far as the naval side of the war is concerned, there has thus far been little to note on the meteorological aspects. With the approach of winter, and the increase of stormy weather over the northern seas, it was reasonable to expect losses due to gales, and thick weather, and fogs, and to suffering from

the cold. Rough water and fog make the approach of a submarine difficult or impossible to see, and therefore help the attacking vessel. Submarines do their best work in the worst weather. We note that the weather was "bitterly cold" at the time when the British cruiser Hawke was torpedoed, so that the chances of saving the men who were struggling in the water were greatly lessened.

Special precautions must be taken to guard against collision, shipwreck, and submarine attack in winter. The German fleet has perhaps been waiting for a winter gale to scatter the British ships. On Dec. 5 the British cruiser Venus was driven ashore in one of the winter storms. A spell of foggy and misty weather was chosen for the German raid on the east coast of England in mid-December. Such an expedition was to be expected as soon as the winter storms made it more difficult for the English ships to maintain a close blockade. According to English reports, a half hour and a fog saved the German squadron from annihilation. Fog also played a part in the naval engagement off Cuxhaven late in January.

Fogs over the water and land have several times prevented the shelling of the German trenches by the allied fleet, whose gun fire on clear days has been so effective. It is obvious that the navy whose vessels can remain safely in port has the advantage over the one whose vessels are doing patrol duty on a stormy sea. Should there be a naval engagement after a severe gale, when the British fleet has been disorganized and scattered, the advantage, other things being equal, would lie with the Germans, whose crews would be fresh and whose vessels would be in the best condition, coming directly from the harbor. Archangel, which has served as an important port for the allies, was kept open by means of ice breakers at least as late as the first week of January.

It is a notable fact that the Japanese and English fleets advanced to the attack of Tsingtau under the cover of a mist. Further, the naval engagement off the coast of Chile early in November was fought in the teeth of a "norther" which "reached hurricane strength." Small boats could not live in the rough sea and hence there was great loss of life. The heavy weather put the larger ships at a disadvantage. The Good Hope found her guns almost useless because of the ship's rolling.

From the Asiatic war area we have had rather few reports regarding the climatic obstacles in the war. The well known extreme winters of the Armenian highlands made it clear at the outset that but little progress would be made by either side in that particular region before spring. One report says: "Clad in every variety of garments to keep warm, including Turkish robes and wide flowing Kurdish coats, the Russians are huddling in every shelter hut, and in the farm houses, cow sheds, stables, and storehouses. Wherever possible the roofs have been cut out so that bonfires may be safely built within." Frequent mention has been made of the cold and the snow. In the crushing blow which the Russians dealt the Turks early in January, Caucasia,

three days of the battle were during a violent snowstorm. The Turks fought against great odds, for the roads along which they had to retreat were blocked by deep snows, which necessitated the abandonment of many cannon and supplies. The Turkish army crossed the mountains at high altitudes in spite of zero weather. Hundreds of Turkish bodies were found frozen in the snow.

A strong Turkish movement, with heavy artillery, to the Suez canal is bound to be difficult and slow, by reason of the intervening desert. Of all the obstacles which stand in the way of a marching army, a desert is one of the greatest. There is the difficulty of supplying water and food and of moving the guns through the sand. The Turks have realized that a desert is more readily crossed in winter than in the heat of summer, as is evidenced by their activity near the canal toward the end of January. In expectation of the coming of the Turkish troops the English had filled up many wells in the desert.

Thus throughout the area of the great war the weather from day to day is playing its part in the campaign. Modern military tactics, modern armament, modern methods of all kinds, have not in any way eliminated the weather element as a factor of the greatest importance. The story of the present war does not, thus far, read very differently from that of previous wars in the same countries. In 1586 the Spanish, as related by Motley, encountered such terrible rains on the Meuse that they retreated. A previous fall of Namur, in 1692, was largely due to heavy rains which prevented the English from crossing the river and meeting the besieging French army. The English in Flanders in 1708-9 endured great hardships on account of deep snows, which blocked the roads. The cold was intense and the troops, who were short of firewood, suffered severely. The Duke of Marlborough wrote (1708): "Till this frost yields we can neither break ground for our batteries nor open our trenches." The French, in Poland, in 1806-7, found mud three feet deep, drenching rains, driving sleet, melting snow and icy streams. In the Franco-Prussian war of 1870-1, over the same historic ground in France, we read of torrential rains, floods, icy roads, muddy fields, and the suffering on account of cold.

So the story goes on, from age to age, from one war to the next. War and the weather: they are related today, as they were in the past, and as they will be until war shall cease.

GEOGRAPHICAL FACTORS IN THE AGRICULTURE OF DU PAGE COUNTY, ILLINOIS

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THIS discussion of the agricultural geography of a prairie county in Illinois is presented as a type study from the Middle West. It is part of a dissertation submitted to the faculty of the Ogden Graduate School of Science of the University of Chicago in candidacy for the degree of Master of Science in 1911*. Acknowledgement is due Prof. H. H. Barrows, under whose direction the thesis was written.

Du Page County is in the northeastern part of Illinois just west of Chicago. Its area of 339 square miles is underlain by Niagara limestone, which is deeply covered by glacial drift. The drift, with an average thickness of 100 feet, covers an irregular bedrock topography. For details regarding the geography of the county, and for references to the literature, see the complete copy of this thesis, Geology Library, Rosenwald Hall, University of Chicago, and The Geology and Geography of the Wheaton Quadrangle by A. C. Trowbridge, Ill. Geol. Survey, Bull. 19, 1912. Special reference may be made to the manuscript letters of Mr. and Mrs. Daniel M. Greene, from Lisle Township, Du Page County, written between 1835 and 1878, and of Mrs. Strong's, written between 1830 and 1850.

Du Page County from the beginning of settlement has been devoted chiefly to agriculture, for which it is well fitted. The topography of the county is flattish or gently rolling with slight relief and moderate slopes which can be cultivated easily. It lies in a section having a mean annual rainfall of 36.25 inches with a recorded minimum of 29.8 inches in 1900 and a maximum of 45.4 inches in 1898. The rain is usually well distributed through the year. Occasional drouths, however, do immense damage to crops. The county is well supplied with ground water. The farmers depend chiefly for their water supply upon shallow wells, most of which furnish excellent water at depths of twenty to forty feet. For a county with fair-sized prairies, Du Page was well supplied with timber, well distributed and sufficient in amount to meet all the needs of the early settlers.

The soil of Du Page County is deep and rich, and, being made from the underlying glacial drift, contained all the elements of plant food in suitable amounts. It consists of three general varieties,—the upland prairie soil, the upland timber soil, and the lowland alluvial soil. The alluvial soil is found along the river bottoms and in small patches throughout the ground moraine where there were formerly little lakes or swamps. This soil is black and rich. The soil in the swamp areas is in many places so full of vegetable material that it is not very good for agriculture, unless potassium is added. The upland timber soil is in most places heavy clay, and poor for everything except small grains and

*The two following paragraphs are abstracted from the introductory pages of the thesis, where the general geography was discussed at greater length.

hay. This soil was cultivated first, in the clearings of the timber, and as it was fairly good for wheat, especially as long as the layer of leaf mold lasted, it was supposed to be the only soil suited to that cereal. Soon, however, it was found to be inferior to the prairie soil. It occurs for the most part on the higher ridges and now, even where the timber has been cut off for a number of years, it can be told from the original prairie soil by its lighter color, its stickier character, and the presence of black iron. The prairie soil is the black upland soil. It is usually underlain by brown loam, and was originally about as fertile as the alluvial soil.

The prairies excited the wonder of all travelers and settlers in Du Page County, as in other parts of northern Illinois. They were covered with tall, coarse grass which turned yellow at one stage, quite resembling young wheat. In the damp places the grass grew rank and often nine feet tall. On the upland rolling prairie it was about eighteen inches high, with a compact mass of roots forming a dense sod. The prairie flowers were the inspiration of many early poems and, judging from the descriptions of travellers, they must have been brilliant in the extreme. The prairies, with their covering of long grass undulating in the wind, were often likened to a great sea, out of which groves of timber rose like islands. Every year the Indians set fire to the prairies (1) to drive the game to the timber, (2) to facilitate the speed of their horses, and (3) to afford no cover for enemies. Even after the Indians departed, prairie fires often were set by those who believed that the layer of ashes over the prairie was beneficial to the soil and that it would aid the next year's growth of grass.

The prairies were very useful to the immigrant and settler. They afforded fodder for cattle and horses and made the planting of hay unnecessary for a number of years. This was of primary importance because of the difficulties of producing crops on only a few acres, so if hay for the cattle had had to be procured too, it probably would have meant decrease of the herd and a consequent loss of meat, milk, butter, and cheese, which were the mainstays of the early households in Du Page County.

Cattle were brought from the East or imported from the South. The price of good milch cows in 1836 in Du Page County was $25.00 and in 1837, $25.00 to $40.00, and they paid for themselves in one summer. The farmers turned as many cows as they pleased on to the prairie and cut enough prairie grass to last through the winter. In Du Page County agriculture was more advantageous than stock raising, so the number of cattle held by each pioneer farmer was usually only enough for his own use, and no products were sold, except butter occasionally.

Many settlers could not wait until the sod was disintegrated to plant a crop, and so raised "sod corn" and "sod wheat." This meant hewing apart the sod with an axe or spade, dropping corn or wheat into the cracks, and "applying the heel freely." This was not always a certain method of raising a crop. In some cases seed had to be planted several times because prairie chickens scratched it up.

Agriculture in Du Page County is naturally divided into three periods, (1) from 1830 to 1850, (2) from 1850 to 1870, (3) from 1870 to the present.

Corn was the staple crop of the pioneers of Du Page County. It was easily raised and afforded large returns for time and labor expended. It had a long harvest season, which was important as labor was often scarce. It was fed to the stock in winter, and constituted the main, and at times the only, article of diet for all early households. It could be ground at home, and used in various forms such as mush and hominy, corn bread, corn cakes, etc. It was easily stored and handled, but was too bulky to be transported far.

Next to corn, wheat was the chief crop in early days. At first many plants from fall-sown seed were winter-killed, and so spring wheat was considered the surer crop. Toward the end of the period, the chinch bug destroyed much of the spring wheat, so winter wheat came into favor. Oats followed wheat in importance, and some barley, buckwheat, rye and flax were raised. The New Englanders had excellent gardens and orchards. Most of the common vegetables and fruits were raised, the seeds being imported from the East. Melons seemed particularly adapted to the prairie soil in Du Page County, and excelled any that the Easterners had known before.

Farming operations were hindered at this early day by lack of implements. The New Englander as a rule was supplied best, his stock usually consisting of an axe, plow, and scythe which he had brought with him from the East. The plows were clumsy affairs of cast iron, which plowed only four or five inches deep and in such a way that almost one-third of the land was not benefitted. They had to be guided by hand, and a man walked twenty-five miles and more a day while plowing one and one-half or two acres. Corn was planted by hand and covered with a hoe until, toward the end of the period, a hand planter was introduced by which planting and covering were performed in one operation. Small grain was sown broadcast by hand and harvested with sickle or scythe and cradle. Threshing was done by flail on the barn floor.

All the methods of agriculture in this period are characterized by crudeness and waste. The farmers believed in the inexhaustibility of the virgin soil and thought that the rotation and fertilization practiced on the worn lands in the East would never be necessary on their fields. The great yield of the prairies is probably responsible for these ideas. The first crops, even with the fields only partially broken, were about as large as our average yields of today, with all our advantages of modern agricultural methods. A letter written from Du Page County in 1835 states that much of the corn was twelve feet high, while eight to nine feet was the average, with ears often six feet from the ground; the yield was forty bushels per acre. This crop was raised by the writer the same year that he came west, so it was presumably sod corn. Later we have reports varying from forty to eighty bushels of corn per acre. While allowance should be made for the exaggeration of early re-

ports, yet the average for the county probably was at least twenty-five per cent higher than now. An ordinary first crop paid all the expenses of breaking, plowing, harvesting, and marketing.

Until 1838, farmers in Du Page County reaped large profits from their farms. The supply of produce never quite equalled the demand. New settlers bought of those who had come before. Immigrants and speculators were arriving in such numbers that the demand for farm produce in Chicago and in the taverns along the trails made prices high. In 1836, work began on the Illinois and Michigan Canal, and this offered another market for the Du Page farmer. In 1835 corn was $1.00 to $1.25 a bushel, wheat $1.25 to $1.50, oats 90c to $1.00, potatoes, 50c to $1.00, flour $10.00 to $15.00 per barrel, and pork $15.00 per barrel. In April, 1837, wheat reached $2.00 a bushel. The panic of 1837 affected the price of produce and the decline continued until 1843. Work was suspended on the canal and money was so scarce that trade was carried on chiefly by barter. All produce was extremely low in 1843. Pork was sold at $1.50 and $2.00 per one hundred pounds, the lowest to that time in Chicago. In 1844 corn was only 25c a bushel, but increased in value from then till 1850. Pork and beef did not begin to rise on account of a slight overproduction until the famine in Ireland (1846 to 1847) called for all the grain the West could produce. In 1850 pork was selling for $4.00 or $5.00 a hundred pounds. Although corn was raised chiefly for home use, it was found profitable to sell at high prices. There was a difference of 25c on the price of produce in Du Page County and in Chicago. Wheat was raised chiefly for market, although some was converted into flour for home use. Potatoes were marketed in this period and often a calf or hog was found on the farmer's wagon as he drove to market. Some wool was marketed, but not so much in this period as later.

Most of the produce was carted to Chicago. An early start with good roads would bring the Du Page County farmer into Chicago in time to market his produce the same day. A bridge was built in 1847 over the Des Plaines River at the site of Maywood through the efforts of the Du Page County farmers, who insisted on marketing their produce even during high water.

Scientific agriculture began in Du Page County between 1850 and 1870. The introduction of the reaper probably was the most important advance in farm practice at this time. McCormick reapers were an assured success after 1851, and Du Page County, being near the factory, early benefitted by this invention. Two laborers were required at first, one to manage the horses and the other to rake the grain off the machine. During the Civil War the invention of the raking apparatus dispensed with one laborer.

Cast iron plows gave way to self-cleaning steel plows. Broad-cast seeders were introduced and also wheeled harrows, which were later adapted to riding. Windmills for pumping water became common during this period but were clumsy affairs made of wood. There were a few windmills of Dutch type for grinding flour. Corn-planters were improved to plant two rows at a time.

Threshing was still done by flail and husking by hand. The invention of the sectional plates for the straight sickle edge of the reaper made it as good for cutting grass as grain. The value of farm machinery in Du Page County increased from $86,013 in 1850 to $204,110 in 1860, and $307,498 in 1870; while the population increased in the same time from 9,290 to 14,701 and 16,685. Thus the per capita value of farm machinery increased from $9.15 in 1850 to $18.13 in 1870, or nearly 100 per cent.

Stock raising became more and more important during this period. The rapid settlement of the prairies by the Germans created a demand for horses and cattle. Cattle and sheep also were raised for the meat supply of the county or sold to the slaughtering houses of Chicago. Wool was high in price and the production of the county increased from 34,034 lbs. in 1850 to 153,611 lbs. in 1870. The rapid decline of sheep raising after this date was due to the development of the more profitable dairy industry, so sheep raising had to be transferred to cheaper land. At present there are only 836 sheep in the county, compared with 26,932 in 1870.

The county is well adapted to stock raising. The prairie soil produces excellent fodder, and the upland timbered areas are good pasture land. The number of milch cows increased rapidly, because of the increase in population, and a great quantity of butter and cheese was made. This was the time of greatest output of these products in the history of Du Page County, yet it was all made on the farms. It was usually sold to the country stores but sometimes shipped to Chicago.

The character of the crops changed during the period. With the settlement of the prairies the area of pasture land decreased and hay had to be grown increasingly. Some rye and barley were raised and sold to the breweries at Naperville. Grain farming as a whole declined. Corn and oats were the staple crops but were raised chiefly for feed. Wheat was often unprofitable as it was attacked season after season by rust, mildew, and insects. Fall-sown wheat for a number of years was winter-killed, and so was abandoned altogether by the end of the period.

The opening of the Illinois and Michigan Canal made it possible to take lumber into the interior in large quantities and made Chicago the greatest lumber market in the country. A reduction in the price of lumber followed, much to the benefit of the farmer who was now taking up prairie land a number of miles from the timber. It also led to an enlarging of agricultural operations and the building of commodious barns and houses.

Because of the panic of 1857 prices fell in 1858 and although they recovered to a certain extent the next year they afterwards continued to decline until just before the Civil War when they reached a very low figure. In 1861, wheat sold for 75c and corn for 23c a bushel.

During the war, food was needed for the armies, and the withdrawal of labor made prices advance until in 1864, wheat was $1.81 and corn $1.30

a bushel in Chicago. After that prices declined, except for wheat. The price of the latter was kept up by the foreign demand and its growing scarcity around Chicago. Such a reign of high prices while crops were unusually good, gave the farmers of Du Page County and other places away from the scene of battle, an unusual opportunity. Increasing use was made of farm machines because it not only added to the acreage which a man could cultivate by himself, thus increasing his income, but because it was necessary on account of the absence of so many laborers. Such an era of agricultural prosperity during a great war has no counterpart in history and at the end, instead of the land having depreciated in value in the North, it had risen on an average $5 an acre.

The period between 1850 and 1870 was one of transition, due to the tremendous changes brought about through the medium of railroads. They facilitated the settlement of the prairies, the movement of lumber, machines, and manufactured articles into the country and that of farm products to the city. Under conditions of rapid transportation only, could the dairy industry have developed. The competition of the cheaper western grain in Chicago markets discouraged its production near Chicago. By the end of the period the farmer had gradually adjusted himself to the new conditions which inaugurated another period.

There was notable development of agriculture from 1870 to 1911. The first really scientific plow appeared about 1870. This was light in weight and shaped to cause motion between the particles in the furrow. The first plows had only scratched the surface; the breaking plows with their long, twisted mold boards simply turned the sod and at the same time compacted the subsoil, while the heavy plows of the previous period turned the furrows without loosening the soil particles. Modern plows are (1) adapted for riding (2) combined to do many times the work of one, and (3) adjusted to different kinds of power. For Du Page County the sulky and gang plows are most efficient. Some farmers are adapting gasoline engines to plows as well as to other machines.

Broad-cast seeders have given place to drills which plant and harrow in one operation. Disk drills are the most common, and even corn is planted in this way when used for fodder. Corn harvesting is not yet completely mastered by machinery. There are machines for cultivating, husking, cutting, and shredding corn and stacking it in silos. A great deal of corn is cut while still immature and carried directly to the pastures when they begin to fail in the summer.

Grain harvesters were improved greatly after 1870. An adjustment was made to lift the grain to a table by which two men stood to bind it into sheaves. In 1875 the automatic binding was done but with wire which gave way later to twine. Formerly the bundles were tossed out as fast as bound, but an attachment for holding and delivering bundles at intervals made the shocking less work.

Threshing machines were introduced, and were run first by horse power and later by steam. The grain and straw were expelled together and had to be shaken apart and the straw stacked by hand. Now the threshing machines deliver the cleaned grain in one place and expel the straw by a pipe which can be regulated to build a stack of any size or shape desired. Threshing machines travel through the county from the first of July to the end of summer, often visiting the same farm twice, for winter wheat and later crops.

Many farmers are cutting grain as high as it can be conveniently harvested so that the straw which was formerly wasted will be left in the field. This they turn under, improving both the physical and chemical properties of the soil.

Hay harvesting machines have become important within the last 25 years, particularly the hay loader. This gathers the hay directly from the swath and loads it on the wagon. Hay forks in the barns greatly facilitate the handling of large crops. Some hay is baled on the farm and shipped to Chicago. This is usually done in the spring to make room for the new crop.

Steel windmills have replaced wooden ones and are now found on practically every farm. The exigencies of the dairy business make it necessary to have cold water for cooling the milk. Sometimes the wind is not blowing and the farmer needs some other motive force for his pump. For this reason a number of farmers are installing gasoline engines which when used for cream separators, for running farm machinery, and for pumping water, are very economical.

The saving in time and money brought about by modern agricultural methods and machines is shown by comparing the labor and time required for the early crops and for those of the present. In 1830 an acre of wheat took an average of 64 hours, 15 minutes of labor and cost $3.71, while in 1896 it took 2 hours, 58 minutes and cost 72 cents. In other words, the production of one bushel of wheat took 3 hours of labor in 1830, and 10 minutes in 1896.

In 1880 the average number of acres which could be tended by one man was 23, while in 1900 it had risen to 31 acres. The value of product per person had increased in the same time from $286.82 to $454.37.

The growth of Chicago and the improvement of railroad facilities are responsible for the growth of the dairy industry in Du Page County. It is part of a great industry extending out 65 miles, and more in some directions, from Chicago. It is favored by the relatively cool climate and the good soil. It was encouraged by the decrease in grain farming and the increased attention to stock raising. The demand for fresh milk in the city made its production more profitable than that of butter and cheese. About 1870, factories were built which by their efficiency took over the butter and cheese production of the whole county. They prolonged the life of the butter industry for a decade, but the amount of cheese produced declined very rapidly, as the milk pro-

duction increased. The removal of butter production from the farm has led to a more uniform product of higher grade, especially since the introduction of the cream separator in 1878. The factories now buy any excess milk produced and convert it into butter for the farmer and the town trade. In nearly every town there is a small butter factory, but there are very few cheese factories in the whole county.

The production of milk has been the dominant interest in Du Page County for 40 years, and probably will continue to be as long as Chicago continues to grow or until the land is needed for city uses. It is a permanent and profitable business because the demand is constant and because it does not depend on favorable legislation; furthermore, it benefits the soil. It has led to the improvement of the country roads and has removed by so much the isolation of the farm.

Du Page County has gradually increased in milk production until now it is one of the greatest milk producing counties in northern Illinois. Since 1900, the amount of milk shipped has decreased, because of the increasing amount which is separated on the farm. A number of separators have been installed in the county and are very profitable, since the farmer can use the skim milk for fattening calves and hogs. The cream production rose from 90 gallons in 1900 to 13,000 gallons in 1910.

The milk is hauled to the railroad every morning and shipped to a distributor in Chicago, who has it tested, bottled and ready for distribution in the afternoon and next morning. The regulation concerning the inspection and testing of all milk distributed in Chicago has done much towards making the output of standard quality. Now cement floored barns are common, while white-washed walls and improved sanitary conditions are the rule.

New Topographic-Map of Cincinnati

An excellent example of a topographic map is that which has just been issued by the United States Geological Survey of the city of Cincinnati and environs—an area of over 400 square miles in Ohio and Kentucky. The area includes Ohio River from Tenmile Creek in Pierce Township, Clermont County, Ohio, to the town of North Bend in Miami Township, Hamilton County.

All railroads, electric roads, and principal and secondary wagon roads as well as bridges, canals, and other works of man are shown in their exact relative position. Surveyed in such detail and published by private enterprise this map would doubtless have to be sold for $5 to $10 a copy, but it can be obtained from the Director of the Geological Survey, Washington, D. C., for 20 cents.

CAPE VERD ISLANDS; A VISIT TO SAN VICENTE IN 1890

By Mark Jefferson
Normal College, Ypsilanti, Mich.

WE were steaming through an expanse of long oily swells off the West African coast. The awnings and the Aquila's sixteen knots an hour alone saved us from scorching between the tropic sun and its reflex in the glassy sea. All the afternoon there had been a haze to the north-east, where Captain Lavarello said we should sight San Antonio about six o'clock. This had been a source of great expectancy to all the passengers, as we had seen no land since leaving Fernando Noronha, off the Brazilian coast, and were all ready to hail the Cape Verde Islands as a variation of our daily scene of sea and sky. However, just as the gong rang for dinner, came the expected cry of Terra. Sure enough, the haze had cleared away and there, somewhat to the northward of where we had been gazing, rose a faint blue cloud far into the sky. There was nothing definite about it to look at long, so, after expressing doubts as to whether land could be so high, we went to dinner.

You see many of us had lived beside the lofty peaks of the Andine system; yet the effect of the mountain heights, where they rise sheer from the ocean, is so surprising that Aconcagua's twenty-two thousand feet seem less actually than San Antonio's five or six thousand. You may see the same effect in Green Mountain, Mt. Desert.

That night little more was to be seen than the lights of the Port and the village of San Vicente. We had to defer our sight-seeing till morning. Then we found ourselves lying in a circular bay, nearly surrounded by queer red and black crags of volcanic rock. Here and there a beach or hillside of bright yellow sand varied the scene, while to the right of the town, a long hollow swung back from the bay, carpeted with what seemed at first sight low firs, but on nearer approach, turned out to be plants peculiar to the islands. They are apparently maintained by the moisture of an underground water-course that follows the hollow.

Excepting a fine double row of shade-trees on the street along the water front, this is all there is of green on the island, fruit and vegetables being brought from San Antonio, that looms blue and hazy before the entrance to the harbor.

Nearer, dividing in two the harbor's mouth, stands an odd-shaped jagged rock, bearing the chief lighthouse high above the waves. The whole rock foundation of the island is so soft that the sea and weather readily work it into fantastic forms. The most notable illustration of this fact is seen looking seaward from the centre of the town. It is a huge face profiled in the hill-tops, gazing skyward. We climbed some lesser heights behind the town and

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The above notes were written down in 1891, one year after the event, excepting the parenthesis near the end, which I am adding from memory.

found the firmest of the rock crumbled beneath our feet. Driven down to the shelter of the town by the sun's glaring rays, our attention was attracted by the throng about the public well, and we stopped to peer in. Without, it is a circular structure of volcanic rock, faced with lime, as are all the buildings on the island. Walled up for about ten feet from the ground, open arches, supporting the broad roof above, allow a free circulation of air within. The building is about thirty feet in diameter and is entered through a broad door to the north. Within, the actual well occupies the centre, being enclosed by a parapet about breast high opening on the side side to a sort of balcony over the water. There the women stand to lower their cans to the water. The form of this balcony and of the masonry brackets that support it is sufficiently graceful to lend a certain beauty to the otherwise simple lines of the building. The cans once filled, were lifted in true southern style to the heads of women and balanced nicely on a sort of turban of wet rag that is applied to the crown of the head for this purpose. Those who have not seen can hardly appreciate the ease with which even unstable loads can be carried in this manner. For instance, I have seen a South American Indian girl carry a quart bottle filled with milk, simply standing it upon her head. To them it is an every day matter. One recalls the English contractor on an Indian railway-cutting who thought humanely to substitute wheelbarrows for the baskets in which the coolies carried the excavated earth on their heads. On visiting the cut, to observe the result of his innovation, he found the navvies *carrying the loaded barrows on their heads!*

The well, as a centre of common necessities, is one of the liveliest points on the island. Of course women predominate as drawers of water.

The physical types vary between pure African and Portuguese, but visitors of every nationality may be met with at any time, as all the English, German and Italian steamship lines take this convenient place for their coaling station on the South American voyages. The French, of course, prefer their own station at Dakar on the African coast opposite.

Passing down the well-paved streets—there are no horses nor carts—we were invited by a sentinel to visit the jail. We stepped in. The building differed from the usual residence only in having wooden and iron bars across its doorways. Standing in the corridor, we could converse with the prisoners inside about the reason and length of their imprisonment. They were cheerful and no worse appearing than the usual run of the inhabitants, nor did they seem to feel shame at being thus made objects of curiosity, rather availing themselves of the opportunity to beg the visitor for small coins or tobacco. Of course the impassive jailors expect to share in this bounty.

But most striking among the sights of San Vicente to our eyes was the Cammoens school, where an aged negress, dressed in the most spotless white, presided over two rooms full of bright, neatly dressed little girls, daughters of the richer class among the islanders. There were no benches; only chairs in no fixed order.

The height of the room, occupying the whole one story of the building, the size of the windows, hung with curtains of matting, and the contrast of coolness and neatness within to the heat and dirt of the street without, combined to make the school one of the most attractive I ever saw. The little girls in one room seemed to be having a recess as we entered, and crowded fearlessly about us, eager to know from what country we came and in what steamer, being too well acquainted with such visitors to wonder at our presence. We were a party of a dozen gentlemen, Spaniards all except myself, and all a good deal older than I. Doubtless the teacher thought the party was all of Spaniards. I am sure the lesson that followed would not have been given had she known that a North American was present. It turned on the character and disposition of the English people, apparently part of a Geography lesson. It came out that the English were cruel and bloodthirsty. As evidence was cited the habit of English boys who differed in opinion of going off behind the school, as like as not under the escort and advice of some of the older boys, to beat each other about the face with their bare hands until their eyes were blackened and their noses bled. So too the grown up people paid large sums of money to see savage, half naked men fight with their fists for a prize. And the Americans had much the same habits. Prize-fights there attracted great numbers of wealthy and influential people, the governors of many states never failing to attend!

(Ten years later I was visiting a school in the town of Concord, Massachusetts and chanced into the geography class where the teacher was bringing out the inherent savageness and brutality of the Spaniards. She cited the bull-fights as evidence; how the people enjoyed seeing the angry bull tearing open with his sharp horns poor old horses that had not spirit enough to escape, only to be slain in his turn by a highly trained and well armed man, who gave him equally little chance for his life! How the occasion was a holiday one, the day being Sunday or some other festival and the world of society turning out in its gayest attire to see the event, even the queen of Spain herself. Both teachers ladies of dignity and charm and both instilling into children's minds the poison of an elementary contempt and hatred of the foreigner.)

A nod to the teacher, an *Adios* to the children, and we are off to the bay where the Aquila lies darkly silhouetted against the pale blue outline of distant San Antonio.

The area of California, 158,297 square miles, is approximately equal to the combined area of Roumania, Bulgaria, Servia, Albania, Montenegro, Belgium, and Turkey in Europe.

The population of California, according to the latest census, was 2,377,000, as against 28,532,000 for the European countries named.

Of California's total area, it is of interest to note that 70 per cent has already been topographically mapped by the United States Geological Survey.

MATERIAL FOR USE IN SCHOOLS

Supplied by the U. S. Department of Agriculture, Forest Service.
Washington, D. C.

For Free Distribution

Farmers' Bulletins—

173—A Primer of Forestry, Part I
358—A Primer of Forestry, Part II
423—Forest Nurseries for Schools
134—Tree Planting on Rural School Grounds
228—Forest Planting and Farm Management

Forest Service Pamphlets—

The Country's Forests
Our Timber Supply

Maps—

Natural Forest Regions of North America (16″x20″, paper).
National Forests of the United States (21″x33″, paper) (5′x7′, paper).

Material Which May Be Had Temporarily as Loans

Traveling Exhibit of Commercially Important Woods of the United States.

The Forest Service has prepared sets of sixty-four samples of commercially important woods of the United States, together with maps showing the region in which each species grows and a short statement of its principal uses and physical characteristics, for loan to schools, libraries, and other educational institutions. Four wood samples are arranged on a photographic mount measuring 16½x10 inches, and these mounts are affixed four on each of four strips of green denim, with eyelets in upper corners for hanging. The whole exhibit covers a wall space about four feet high by six feet long.

This exhibit is loaned for short periods under agreement with the borrower that he pay transportation charges and forward it promptly to the next place of exhibition at the direction of the Forest Service. The exhibit, wrapped for shipment, weighs about nine pounds.

Application for the loan of this exhibit should be made directly to the Forester, U. S. Department of Agriculture, Washington, D. C.

Traveling Photograph Exhibit

A special collection of 44 large mounted photographs on "The Forests of the United States, Their Use and Preservation," has been prepared as a traveling exhibit to be loaned to schools, libraries, and other educational institutions. These photographs are arranged in 11 series of 4 pictures each. These series, with their descriptions, form illustrated "stories" on special features of forest work and forest conditions. Each series is mounted on a strip of green denim cloth, with eyelets in the upper corners, for hanging. The whole exhibit covers a wall space 4½ feet high and about 14 feet long.

This exhibit is loaned for short periods on condition that the borrower agrees to pay express charges and to forward the pictures promptly to the next place of exhibition at the direction of the Forest Service. The exhibit wrapped for shipment weighs about 18 pounds. Applicants for the pictures should write directly to The Forester, U. S. Department of Agriculture, Washington, D. C., and ask that a reservation be made.

Special Lantern Slide Sets

Several special sets of colored lantern slides have been prepared for educational use, some of general interest, some of special interest to teachers. Each set is accompanied by a syllabus for a lecture. These slides will be loaned for short periods, on condition that the borrower agrees to pay transportation charges from Washington and return, and to be responsible for slides lost or broken. The subjects upon which special sets are available are as follows:

Of General Interest—

General Forestry
Conservation of the Forest
The Work of the Forest Service
The Care and Protection of Shade Trees

For Special Use in Schools—

Nature Study and Forestry
Botany and Forestry
Manual Training and Forestry
Geography and Forestry
Agriculture and Forestry

Persons wishing to borrow any of these sets should make application for them as long as possible before the date on which they are needed, so that reservations can be made.

Material which may be purchased—

Publications—Any of the publications of the Forest Service in print may be secured by purchase, in any quantities desired, from the Superintendent of Documents, Government Printing Office, Washington, D. C. He will furnish a price list on request.

Among the publications recommended for school use, of which the supply available for *free* distribution is exhausted, are the following:

Forest Service Circulars—

No. 96—Arbor Day ..... .05
No. 130—Forestry in the Public Schools..... .05
No. 171—The Forests of the United States, Their Use..... .05

Office of Experiment Station Circular—

No. 117—A Working Erosion Model for Schools..... .05

Price List of Photographic Material

Under Act of Congress, approved June 30, 1906, the Forest Service is

authorized to sell photographic prints, lantern slides, bromide enlargements and transparencies. The prices at which this material can be sold are given below. Payment for all material made for sale is required in advance. Remittances should be made by Postal money order or bank draft drawn in favor of "The Treasurer of the United States," but mailed to the Forest Service. Requisitions should be placed as far in advance as possible, since material for sale can be made only as the regular work of the Photographer of the Forest Service will permit.

Price List of Photographic Work—

Photographic Prints:

Size	Unmounted	Mounted
4 x5	$0.06 each	$0.08 each
4¼x6½	.07 each	.09 each
5 x7	.08 each	.10 each
6½x8½	.11 each	.14 each
8 x10	.17 each	.20 each
Lantern Slides	35c each uncolored	
Bromide Enlargements	.003 per square inch	
Bromide Enlargements (Sepia)	.004 per square inch	
Transparencies	.015 per square inch	
Coloring Lantern Slides	65c each	
Coloring Bromide Enlargements	.01 per square inch	
Coloring Transparencies	.02 per square inch	

Prospective purchasers of photographic material should submit a list of subjects to be illustrated, giving the number of prints desired on each subject, and stating as fully as possible the character of the pictures wanted. If prints are to be ordered, the size preferred should also be stated. A careful selection of the negatives will then be made and a list submitted to the purchaser with a statement of the cost of furnishing the material.

CURRENT GEOGRAPHICAL NOTES

The Yukon River

The Yukon River in Alaska is one of the great rivers of the North American continent. A brief report on the discharge of this river at Eagle, Alaska, by E. A. Porter and R. W. Davenport, has been issued by the United States Geological Survey as Water-Supply Paper 345-F. Probably few people have an adequate conception of the size of this river and characteristics of its flow. A. H. Brooks, of the Geological Survey, gives the Yukon fifth place among the large rivers in North America and estimates its drainage area at about 330,000 square miles. Its length, including the Lewes and Teslin rivers, is given in the report as 3,200 miles. The discharge of the Yukon varies from a maximum of 254,000 to a minimum of 10,100 cubic feet a second, or an esti-

mated average flow of 73,200 cubic feet. This is a relatively small discharge, the average flow of the Mississippi being 695,000, that of the Ohio 300,000, and that of the Colorado 23,300 second-feet. The Nile, with a drainage area of 1,262,000 square miles, has an average flow of 116,000 cubic feet a second. The flow of the Yukon is therefore relatively small as related to its drainage area.

Enormous Rainfall in Hawaii

The rainfall on the island of Hawaii varies greatly, ranging from the enormous downpour of 353 inches a year in the upper Waipio Valley to 20 inches on some of the slopes of Hualalai. The only surface streams on the island are found along the northeast coast between Hilo and Kohala. Waipio River, according to the United States Geological Survey, is the largest stream on the island and has been partly developed for irrigation. At Kapoho, on the east point of the island, warm water flows from seams in the rocks. These "warm springs" flow into a pool about 100 feet long, 25 feet wide, and 20 feet deep. The pool is entirely surrounded by rocks and its color varies in shade from a beautiful blue to violet. Waiapele, or Green Lake, is a body of fresh water in the pit of an old crater near Kapoho. This lake covers an area of about 5 acres and is fed by springs below the surface. A pumping plant takes water from this lake for domestic use and for irrigations.

New Map of Montana Issued by U. S. Geological Survey

By international agreement the United States and nearly all the other principal countries of the world in 1909 planned for the preparation of maps of the entire surface of the earth, to be published on a scale one-millionth of actual size, or about 1 inch to every 16 miles, the United States Geological Survey undertaking to prepare the United States portion. All the maps are to be uniform in shape and general appearance and are to have the same conventional signs.

As the majority of the people in this country have more or less use for State maps than for maps of any other kind the Geological Survey decided to utilize the data collected by publishing also maps of each State on a larger scale—about 1 inch to every 8 miles. A map of the entire United States on this scale would cover a sheet 20 by 31 feet.

The Survey has already issued 25 such State maps, the latest one being that of Montana, and this is the largest one of the series so far published. In compiling the map every available source of information has been ransacked for material, and many data never before available to the public in any form have been procured, so that the map far exceeds in accuracy any heretofore published. The map is in two sheets, each 40 by 46 inches, and is sold and delivered free by the Geological Survey for the nominal price of 45 cents.

Hawaiian Volcanoes

The lofty volcanoes of the Hawaiian Islands, rising above the ocean from 5,000 to nearly 14,000 feet, are only the summits of gigantic mountain

masses that rise abruptly from the bottom of the Pacific. Mauna Loa, on the island of Hawaii, stands 13,675 feet above sea level, according to the United States Geological Survey, but its slopes descend beneath the sea, as shown by deep-sea soundings, with a grade fully equal to if not greater than that of the visible slopes. The same is generally true of the submarine slopes of the other islands, and the depths attained by these continuous slopes, within 30 to 50 miles of the shores, vary from 14,000 to 19,000 feet. Mauna Loa and Mauna Kea, if their true bases are considered to be at the bottom of the Pacific, are therefore mountains of as great an altitude as Mount Everest, or approximately 30,000 feet. In general the Hawaiian Island group consists of summits of a gigantic submarine mountain chain which projects only its loftier peaks and domes above the water. On the island of Hawaii the volcanic forces are still in operation.

The one continuously active volcanic vent of the island is Kilauea, far down on the eastern flank of Mauna Loa—"the great mountain." No other volcano in the world approaches Mauna Loa in the vastness of its mass or in the magnitude of its eruptive activity. There are many volcanic peaks higher in the air, but most of them are planted upon elevated platforms, where they appear as mere cones of greater or less size. It is not yet known at what level the base of Mauna Loa is situated, but it is below the sea—probably far below.

Mauna Kea—"the white mountain"—is also a colossus among volcanoes. Its summit—13,825 feet—is a trifle higher than that of Mauna Loa, but its slopes are steeper and its base is therefore much smaller. The magnitude of Mauna Loa is due chiefly to the great area of its base, which is nearly elliptical in shape, with a major diameter of 74 miles and a minor diameter of 53 miles, measured at sea level.

In the aggregate of its eruptions Mauna Loa is also unrivaled. Some of the volcanoes of Iceland have been known to disgorge at a single outbreak masses of lava fully equal to those of Mauna Loa. But such outbursts are infrequent in Iceland, and a century has elapsed since any of such magnitude have occurred, though there have been several minor eruptions. The eruptions of Mauna Loa are all of great volume and occur irregularly, at an average interval of about eight years. In view of the total quantity of material it has disgorged during the last century, no other volcano is at all comparable to it.

Mauna Loa and Kilauea are in many respects abnormal volcanoes. The most notable feature is the singular quietness of their eruptions. Rarely are these events attended by any of that extremely explosive action which is characteristic of nearly all other volcanoes. Only once or twice within the historic period have they been accompanied by earthquakes or subterranean rumblings. The vast jets of steam blown miles high, hurling stones, cinders, and lapilli far and wide, filling the heavens with vapor and smoke, and hailing down ashes and fragments over the surrounding regions, have never been observed here. Some action of this sort is indeed represented, but only in a feeble way. The lava wells forth like water from a hot, bubbling spring, but so mild are the

explosive forces that the observer may stand to the windward of the grandest eruption, so near the source that the heat will make his face tingle, yet without danger. Ordinarily the outbreak takes place without warning and without the knowledge of the inhabitants, who first become aware of it at nightfall, when the sky is aglow and the fiery fountains are seen playing. As the news spreads, hundreds of people flock to witness the sublime spectacle, displaying almost as much eagerness to approach the scene of an eruption as the people of other countries show to get away from one.

Chile and Argentina

Clippings from Prof. E. A. Ross's fourth paper on "South of Panama" in the Century for February—

"In Valparaiso one is struck with the signs of English influence: on the commercial streets every third man suggests the Briton."

"The central valley running north and south for two hundred miles * * * is the heart of Chile."

"This is a land of great estates, held chiefly by absentees, and its produce goes not to sustain a fine rural life but to keep up a house in a provincial capital, or a mud-and-marble mansion in Santiago.

"The best thing in Chile is the horse * * * the worst thing in Chile is the roads.

"About 30 years ago a stream of German immigration laved southern Chile. * * * The country abounds in fine farm houses and big barns like those of the Germans in Wisconsin. * * * In every case the mayor is a German, elected by Chilean votes, for the Germans enjoy a great reputation for probity in public office."

"As a laborer the Chilean has good points—physical endurance and energy; but he must have direction, and working on his own place for himself, he is fitful."

"After a night's run we woke half way across Argentina. The pampa is amazingly level—as flat as the flattest prairies of Illinois. Channels, erosions, or other signs of running water there are none. In one hundred and fifty miles I noticed not one bridge or culvert on the railway."

"Buenos Aires, with its million and a half inhabitants, is a veritable Niagara of human power."

"Argentina has the future of a white man's country; * * * the proportion of the blood of the Argentine people which is non-Caucasian certainly does not exceed five per cent. * * * No people of the Western Hemisphere, save the Canadians, is racially so European as the population of Argentina."

"While Argentina has in store growth and prosperity, I do not look for her people to manifest as much force of character as the American people at the corresponding stage."

The JOURNAL of GEOGRAPHY

Volume XIII APRIL 1915 Number 8

THE GEOGRAPHY OF TENNESSEE

By W. M. Gregory
Normal School, Cleveland, O.

TENNESSEE is the child of North Carolina and Virginia. Her northern and southern boundaries are inherited lines from colonial land grants given by Charles II. The rugged Unaka Mountains, the western range of the Blue Ridge, are the barrier on the crest of which is the eastern boundary; the western limit of the state is determined by the Mississippi River. This stream was a route offering easy access to the early explorers, among whom were DeSoto in 1541 and LaSalle in 1682. The Unaka Mountains were such a difficult barrier that the early settlers in the state felt so isolated from their homes in North Carolina and Virginia, that they formed the state of Franklin and, for the purpose of protecting their trade upon the Mississippi, even considered casting in their lot with a foreign country. In consequence of these early ambitions, Tennessee was admitted as a state in 1796 with its capital located at Knoxville. The early settlement of the state was due to its rivers, which were a means of easy transportation reaching back to the gaps in the mountains; also the early quieting of Indian claims had a considerable share in rendering the land safe to the pioneer. Tennessee was the route across which moved a great stream of settlers for other states, and in this manner became a "mother of states." It has been the home of three Presidents: Jackson, Polk, and Johnson. Many southern statesmen claim Tennessee as their native state, and in the Civil War it was a battlefield second in importance only to Virginia.

The state includes a portion of nearly all the great physiographic regions east of the Mississippi River. The hard crystalline rocks along its eastern border form the highest mountains of the Appalachians; the folded limestones and shales have been deeply eroded to form the Great Valley; the horizontal sandstones constitute the Cumberland Plateau, west of which is the Central Basin and the western valley of the Tennessee River; and the extreme western portion of the state is a low plateau, the bluff of which overlooks the alluvial plain of the Mississippi.

These eight distinct physical regions of Tennessee have influenced or controlled the occupations and industries of the state to such an extent that it seems best to describe them more in detail.

1. *The Unaka Mountains*

These granite mountains are the most massive of the Appalachian Highland and in their parallel ranges on the eastern border of the state are the high, well-rounded domes of Mt. Mitchell and Mt. Guyot. These mountains are the base upon which was deposited the series of sedimentary rocks from which

the features of other portions of the state have been eroded. The long continued erosion has entirely removed the former covering of sedimentary rocks, and now the granite core forms the well weathered slopes of the Unakas. These smooth, waste-covered slopes are heavily forested nearly to the grassy "bald" at their summit. Where the tributaries of the Tennessee cross these mountains occur deep, rugged valleys occupied by railroad lines and highways.

2. *The Valley of East Tennessee*

This portion of the Great Valley was eroded from layers of sedimentary rocks which have been greatly folded and faulted. This long valley is about sixty miles wide from the Cumberland Gap to the edge of the Unakas, while farther south in the vicinity of Chattanooga it is less than forty miles in width. The western edge of this great valley is determined by the almost continuous escarpment of the Cumberland Plateau, Walden Ridge, which stands about 1000 feet above the general level of the valley floor. On the floor of this valley are low longitudinal ridges which are the most continuous and the highest in its western half, while in the eastern portion the ridges are much smaller and less continuous. These ridges determine in a very striking manner the course of the minor streams and the lines of traffic. The Tennessee, flowing southwest, is the master stream; the southern half of its course is at the foot of Walden Ridge which position it has attained by cutting across the longitudinal ridges from Knoxville to Kingston. The Clinch, Holstein, and French Broad are its tributaries from the northeast, while the Hiwasse is a transverse branch from the southeast. The latter stream has many creeks, joining it at right angles from the valleys or "coves" between the main ridges. Near Chattanooga the Tennessee River turns sharply upon its course in the famous "Moccasin Bend" and passes into the deep, steep-sided gorge which it has cut into the Cumberland Plateau. It has been suggested that this course of the Tennessee is the deeply intrenched course of the ancient river.

3. *The Cumberland Plateau*

This region, often incorrectly called the Cumberland Mountains, is a smooth tableland except along its ragged western edge and the steep, irregular face overlooking the Great Valley. The bed rock is a horizontal sandstone which bears the coal measures of the state. The land is wooded with scrub oak and the lean soil derived from the underlying sandstone is ill adapted to agriculture.

4. *The Highlands and the Basin of Middle Tennessee*

The central portion of the state is a saucer-like depression, the deep portion of which is the Central Basin while the broad rim is the Highland Region or Rim. The Central Basin is 300 to 400 feet lower than the Rim, and its surface is gently rolling with here and there a small unconsumed rocky hill. The Basin has outlets cut in its rim by the Duck, Elk, and Cumberland rivers. The rich soil has been weathered from the underlying blue limestone, and it is the richest agricultural region in the state. It is a "Blue Grass" region as

fertile as the more famous one of Kentucky. This "Dimple of Tennessee" supports the largest part of the population of the state. Nashville, which is situated on the southern-most bend of the Cumberland river, is in a low part of the Central Basin. The Rim of Highlands consists of barrens along the edge of the Basin. Back from the edge is a belt of fertile red soil, while throughout the Highlands limestone sinks are widely distributed, and caves frequently occur.

5. *The Western Valley of the Tennessee*

The Tennessee in its northern course across the state has entrenched itself in a deep and narrow valley, less than ten miles wide and nearly 500 feet below the general surface. Excellent soils occur in the narrow bottom lands, and the stream is a highway for river traffic.

6. *Uplands of Western Tennessee*

The lands slope gradually from the valley of the Tennessee to the bottom-lands of the Mississippi. The "Bluff" edge of these uplands overlooks the broad flood plain of the Mississippi, and where the river reaches the base of the bluff, there is a natural site for a landing place and a trading city. The light sandy soils are formed from the soft Cretaceous and Tertiary bed rock. The bluff loess is a broad belt 20 to 30 miles wide in the western half of this region, and undoubtedly owes its origin to the fine alluvium carried by the wind from the bottom lands to the bluff.

7. *The Mississippi Bottom Lands*

Along the western border of the state are the low swampy bottom-lands of the Mississippi flood plain, which are not over 215 feet above the Gulf of Mexico. It is the smallest of the natural provinces of the state, and it has its greatest width in the Reelfoot Lake district at the northwestern corner of the state. This latter region is of considerable interest as it was not in existence before the earthquake of 1811-12. This disturbance dammed up the old course of Reelfoot River forming a lake 18 miles long and three miles wide.

Climate, Soil and Agriculture

Climate.—The climate within the state is considerably modified by the range in elevation from 200 feet above sea in the Western bottom-lands to 5,000 feet in places in the Unaka Range. The average annual temperature for places in the latter range is 45 degrees and for the bottom-lands 61 degrees. The length of the growing season, or the season between killing frosts, is of the greatest importance where agriculture is the chief occupation. The growing season ranges from 180 days to 200 days. In some sections of the state a wheat and corn crop may be taken from the same soil each season. The total precipitation is nearly 50 inches, and the months of the growing season receive the most rain, while fall droughts are common. In 1913 Nashville had 261 days with no measurable fall of rain. Snowfalls are light and remain only a few days. Low temperatures are rare and of short duration; in conse-

quence, pastures are green throughout the year, and stock does not require much shelter. High temperatures are common in summer, and the periods of excessive heat frequently prevail for two weeks. At Nashville in 1914, there were five days when the temperature was 100 degrees or over.

Soil.—The soils of Tennessee are largely residual and are closely related to the geological formations of each section of the state. The Appalachian Mountains on the eastern border are covered with gentle slopes of waste formed from the long weathering of the granites and metamorphic rocks. The rich and fertile soils derived from limestone and shale cover the largest area of the state, being confined to the Great Valley, the Highland Rim, and the Central Basin. The sandstone of the Cumberland Plateau forms the poorest soils and, in consequence, the farm values in Cumberland, Morgan, and Fentress counties are low, ranging from four to seven dollars an acre. The loessial soils in the western portion of the state are easily worked and especially adapted to cotton. The rich bottom-land along the Mississippi River where it has been well drained is highly productive. About one-half of the state is improved farmland, and in this respect Tennessee ranks first in the southern states.

Crops.—Corn, cotton, wheat, tobacco, and hay are the five important staple crops of the state. Tennessee is an ideal corn country, especially the shale and limestone soils of the Central Basin and the Great Valley. The largest production is in the counties of Maury, Giles, Rutherford, and Gibson. The corn patch is an essential part of every farm, and it enters largely into the people's food. This is the home of johnny cake, corn dodger, hoe cake, and other forms of corn bread. Cotton is the second crop in value and its production is confined largely to the southwestern part of the state, especially Shelby and Fayette counties. The acreage devoted to cotton has not increased as rapidly as that of some other crops for there has been an active and state-wide campaign to discourage the one crop system, and this has resulted in mixed farming. Wheat ranks third in value as a state crop, and the Central Basin is the chief region for its production. The hay and forage crops are fourth in the agricultural products of the state. Timothy and red top are important as fodder, while blue grass is the chief pasture in the Central Basin and the Great Valley. Clover, soy beans, cowpeas, and alfalfa are being increasingly used on lands worn-out under one-cropping. Tobacco is among the five great crops of the state, and in the annual value of this crop, Tennessee ranks fifth in the country. The dark tobacco is raised most extensively in Montgomery, Robertson, and Weakly counties. This district belongs to the black tobacco region of Kentucky, and much of the product is shipped through London and Liverpool to be consumed in Belgium, Italy, and some of the western Asiatic countries.

Outside of the staple crops, Tennessee has some special agricultural products worthy of mention. The peanut belt is in the western valley, and sweet potatoes are widely grown throughout the entire state. In the growing and

marketing of strawberries for the northern markets, the state ranks first in the South. It is one of the leading states in egg production and turkey raising. It ranks second in the growing of sorghum cane for the home manufacture of "long sweetening."

The state possesses excellent climatic advantages for stock raising in the long out-door grazing season and the mild winter. The corn crop is turned into pork, and the hog ranks fourth among the domestic animals. The horse is the most important of the farm animals for work and for breeding. On the famous stock farms, such as the "Belle Meade" near Nashville, have been bred some of the fastest running and harness horses in the world. In the breeding of the finer types of mules Tennessee excels, and a large number of these useful draft animals are exported to European countries.

The per capita farm wealth is $380, as compared with $1380 for Wisconsin and $2695 for Illinois. This is due in part to the Civil War which completely disorganized all lines of business, and still more to the influence of the one crop, farm tenancy, and supply merchant system. It is stated by careful investigators that "the production of food stuffs in Tennessee ($65 per capita) does not provide enough bread and meat for its people." Only about one-third of the counties are self-supporting in their production of food stuffs. It is further stated that "the state spends 39 millions of dollars for hog and hominy which is imported from other states and could be raised at home." The per capita wealth of Tennessee's farm population by counties ranges from $97 in Polk County to $703 in Williamson. The rough lands of Polk County are unsuited to agriculture and most of its people are engaged in copper mining. In Williamson, the soils are rich; there are nearby markets in Nashville easily reached by good "pikes"; its farmers practice the many crop, live-stock ownership system.

Mineral Resources

Tennessee has a wide range in its mineral resources for its rock formations extend from the oldest granites to the latest river formations. Its 200 soft coal mines are chiefly in the Cumberland Plateau, in the counties of Campbell and Claiborne, and yield annually about seven million tons. The three iron ore fields are closely associated with the coal deposits and yield each year about three-quarters of a million tons of ore which is consumed in the 24 iron furnaces of the state. The rich phosphate beds are widely distributed in Middle Tennessee, from which nearly half a million tons are annually mined, giving the state second rank in this product. Columbia is the chief center for the preparation of the phosphate fertilizer for market. The hard crystalline rocks of Polk County have rich deposits of copper which are mined chiefly in the vicinity of Ducktown; this is the second largest copper producing center east of the Mississippi. Fine kaolin occurs near Sparta, high grade china and pottery clays are mined in Fayette, Henry, and Carrol counties. Large amounts of the high grade clays are shipped to East Liverpool, Ohio, for chinaware. The shales of the coal measures are being used to some extent for brick, sewer pipe,

and paving blocks. The quarries of Knox County yield the famous Tennessee marble which is widely used for interior decorating and finishing. The Parian white, black, blue, brown, and pink are some of the shades of these marbles quarried near Knoxville.

Forests

The forests of Tennessee are rich in the hardwoods and their distribution is closely related to the soils of the different regions. In the Central Basin, where the soil is largely a decomposed limestone, rich in plant food, the natural forests were black walnut, hickory, beech, tulip, and hackberry. The lean soil of the Cumberland Plateau produces a scrub oak which is the source of much of the present oak lumber, some pine, and some hemlock. On the rich western bottom lands are the cottonwood, the bald cypress, and the live oak. Oak, maple, walnut, and hickory are the chief forest growth on the flanks of the Unaka and in the Great Valley. Tennessee is the leading state in the production of hickory, oak, and yellow poplar. The forests have been very rapidly removed since the Civil War and in many places great injury has been done to the soil.

Water Power

The state of Tennessee possesses a valuable resource in its waterpower and hydraulic engineers estimate that only one-tenth of the available power is developed. The greater development of the waterpower began in 1912 when long distance transmission lines were completed and hydro-electric machinery installed. During the above year seven turbines with 29,000 horse power were installed. In 1913 fourteen more were added with a total capacity of 63,000 horse power which makes the total development of the state close to 190,000 horse power. At Hale's Bar on the Tennessee River, four more turbines are soon to be installed, and during 1914 construction was commenced on a plant of 80,000 horse-power on the Little Tennessee River. The developments at Hale's Bar, which is 21 miles from Chattanooga, comprise a dam 40 feet high, and 2500 feet long and a large lock chamber to provide for the navigation of the river. The Ocoee River plants near Parksville, some 48 miles from Chattanooga, combined with the above plant provide abundant power for industrial purposes in Chattanooga and the surrounding region. It is estimated by the Tennessee Geological Survey that "probably more waterpower is within fifty miles of Chattanooga than Niagara Falls." Transmission lines already extend from Hale's Bar and Parksville to Cleveland and Knoxville. Other lines are surveyed and under construction to Nashville, Bristol, Johnson City, Greenville, and Elizabethton.

Manufactures

The natural resources of iron, coal, clay, and limestone are located so as to give some advantages in the industries whose raw materials are the minerals. The hardwood forests are widely distributed and they are utilized for the hardwood lumber that enters into the furniture, vehicle, interior finishing,

and veneer woods. Transportation by the Cumberland, the Tennessee, and the Mississippi reaches all parts of the state while the railroad lines comprise several important trunk lines. The output of manufactured products reflects fairly well the natural resources with the exception of the printing business. In printing Tennessee is the leading southern state east of the Mississippi and owes its advantages in this line to the energy and ability of the founders. In total value of manufactured products, the state ranks twenty-sixth and among the southern states its products ranked sixth in value in 1904.

Population and Cities

The state is seventeenth in population, this in numbers is about the same as the city of Chicago. In 1840-50 the state held fifth rank in population for it received and held a large portion of the western immigration. Some of its counties are laid out in circular form, especially White, Warren, and Overton. This peculiar outline was determined by early grants which included all the land within a given distance of some point. Shelby county has the largest area which is nearly eight times as large as that of the smallest one, Trousdale. The average density of population is 52 persons per square mile, and the region of greatest density is Davidson, Shelby, and Hamilton counties which include the largest cities of the state.

The composition of the population is quite remarkable in almost a complete absence of the foreign element. The negro forms about one-quarter of the total population, and of the colored people about one-fourth are mulatto. The latter, according to the thirteenth census, are increasing which adds complexity to the southern social problem. The negro forms a small part of population in the Cumberland Plateau counties, especially the more remote and inaccessible ones. Pickett county in the northern Cumberland region has only eleven negroes and no foreign-born element. Its people are the typical southern highlanders among whom survive an eighteenth century English, the spinning wheel, the bee "gum" and a religious belief unsullied by modern interpretations. These surviving customs are due almost entirely to the geographical control exercised by the inaccessible surface features, and the lack of minerals and of suitable and sufficient land for cultivation. The negro constitutes seventy-five per cent of the population in Fayette County, for its fertile soils produce the major part of the state's cotton, and the negro is the chief laborer in the cotton fields.

Tennessee is largely an agricultural state for close to eighty per cent of its people are on the farm and in small villages. The modern movement of people to the large cities is indicated by the thirty per cent increase in its urban population since 1900, while the same period shows that the rural population has increased only three per cent. Four cities of the state, each with a population of more than 35,000 people, have developed at points possessing marked advantages in manufacturing and transportation.

Memphis possesses commercial advantages in both river and rail transportation. It is sometimes called the "Bluff City" from its location on the bluffs

overlooking the flood plains of the Mississippi. The advantage of its site for a trading center was recognized by the French as early as 1732, when Fort Assumption was built here, and became one of the strongholds in the French line of forts across the country. The interests of the city before the Civil War were largely commercial, but in the modern industrial development it has grown into the first manufacturing center of the state and the leading city in population. Its rapid expansion has resulted largely from the advantageous position it affords railroads in crossing the Mississippi River, and, in consequence, a number of trunk lines are centered here. A large portion of the cotton crop of the Black Belt of Mississippi, Alabama, and Arkansas is brought to Memphis by railroad for shipment via the Mississippi River to New Orleans. The by-products of cotton raising, the seeds, follow the crop to Memphis where there has developed an extensive cotton seed oil industry. Flour mills, lumber and timber, tobacco and food preparations are among the chief industries of the city whose geographical advantages will undoubtedly bring it a greater growth as the commerce of the Mississippi develops.

Nashville was founded as early as 1714 by Clarebville, a French trader, near a salt "lick" or spring that was much frequented by Indians who came to obtain salt. Around this French trading post, about 60 years after its establishment, and under the leadership of Robertson, the town of Nashborough, later changed to Nashville, grew rapidly. It is situated on the broadest flat at the southernmost bend of the Cumberland River. It was early the focus of Indian trails, and of the blazed trails and roads of early settlers, just as it is today a railroad center. The main portion of the city lies in this small basin on the river, and as it has expanded, portions now occupy large tracts on the surrounding heights. In the center of the flat is a prominent rock hill upon which stands the state capitol building; this is conspicuous throughout the city. Along a now abandoned course of the Cumberland River, the railroads have ample freight yards and a Union Depot in the heart of the city. The chief industries are flour milling, lumber and timber, printing, furniture and the preparation of fertilizers. The lumbering products are largely of the hardwoods which are obtained from the Cumberland Plateau.

Chattanooga in the Great Valley may be said to belong to three states, Tennessee, Georgia, and Alabama, for it stands near their junction. Its advantageous site on the Moccasin Bend of the Tennessee River was a camping ground for the Indians, later a trading post, a critical point in the Civil War, and at present it has large industrial interests. The site of the city was originally known as the "Landing" where voyagers would embark for up-river points and those going down stream would disembark to avoid the rapids below the city. Chattanooga, "the Gate City," is located in the southern end of the Great Valley, and near where it opens out to the wide coastal plains along the Gulf of Mexico. The floor of the Great Valley at this place is only 40 miles in width, and on it the Tennessee River is swinging in broad meanders, making a complete turn on its course and leaving the valley by a deep cut gorge

in the Cumberland Plateau. Missionary Ridge, one of the high longitudinal ridges in the valley, is parallel to the Tennessee River and passes a short distance to the east of the city. Its position makes it a vital part of the military key of this region, and caused it to be one of the most fiercely contested battle grounds of the Civil War. Lookout Mountain at the southern edge of the city rises 1500 feet above the river, and from its summit, which is reached by an incline railroad, a wonderful panoramic view of the Great Valley, Walden Ridge and the Unakas is obtained. Chattanooga lies in the heart of the coal regions with iron ore and limestone. Its chief manufacturing interests are concerned with assembling these raw materials and producing foundry and machine shop products. The richness of mineral deposits, their occurrence in such favorable conditions for mining and the minimum of transportation required are factors which will give this region great advantage in the future expansion of its iron ore industry. Chattanooga is near the center of the best hardwood timber of the South. Furniture factories, coffin works, box factories, wagon works, hardwood finish shops, and cooperage plants constitute some of the wood working industries which rank third in the city. Other important lines of industry are flour milling, food products, brewing, and tanning.

Knoxville is in the center of the Valley of East Tennessee; it was formerly the capital of the state and its position at the head of the Tennessee River and near the junction of the Holstein and French Broad rivers gave it importance in early river traffic. Its chief industries are the quarrying and preparation of marble for the market. The surrounding land is well adapted to farming and truck gardening. Early vegetables are raised in large quantities for the northern markets.

DIAGRAM-MAP OF WESTERN WAR ZONE

The March issue of the Bulletin of the American Geographical Society contains an article on "Geographic Aspects of the War," by Professor D. W. Johnson, illustrated by a block diagram of the western war zone. The topographic peculiarities of the Vosges and Ardennes Mountains, the plateau of western Germany cut by the gorges of the Rhine, Meuse and Moselle rivers, the cuesta escarpments of north-eastern France, and the principal valleys which have affected the campaign, are clearly represented. With the aid of this bird's-eye view of the entire western theatre of war one can readily trace the positions of the contending armies, and note many striking examples of the influence of landforms upon detailed movements of armies and general plans of campaign. Enlarged copies of the drawing, size about 29x17 inches, can be secured at a cost of fifty cents each by writing to the Columbia University Bookstore, New York City.

THE CASCADE MOUNTAINS*

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Location, Extent, Etc.

In the western part of the Pacific States, trending parallel with the coast and extending from northern California northward beyond the United States-Canadian boundary, there is a lofty and extremely rugged belt of mountains known as the Cascade Range. The belt attains its greatest width, 100 miles, near the international boundary, and from there southward its east-west extent varies between 25 and 75 miles.

Until recent years, the term "Cascades" was applicable only as far south as the Oregon border. The Lassen Peak Ridge of northern California was then considered the northern termination of the Sierra Nevadas. Recent study has shown, however, that this ridge consists entirely of volcanic material, and therefore presents a marked contrast to the Sierras both in its rocks and in its manner of growth; while its volcanic origin is accepted as evidence that it should be considered the southern extension of the Cascades, noted for their immense development of igneous rocks.

Southern Cascades distinguished.—The mountains of the two northern states, as will be noted in the following pages, owe their existence primarily to uplift and dissection, while in the development of the Lassen Peak Ridge, uplift has played but a minor part. The piling up of lava and other ejecta about more than a hundred volcanic vents has given rise to this ridge. Owing to this great difference in the physiographic history of the two parts of the range, it is deemed best to consider them separately, and therefore, in this article, only that part of the range lying in Washington and Oregon and commonly known as the Cascades will be the subject of discussion.

Topographic Descriptions

Characteristic features.—Before going into detail concerning the history of this portion of the range and the forces to which it owes its existence, let us consider briefly the general topographic features that gradually suggest themselves upon crossing the mountainous tract and viewing the mountains from the summits of a number of peaks. At first the range seems "a puzzling complex of ridges and peaks," (I. C. Russell) but soon one is impressed with the general uniformity of altitude. One soon realizes that the Cascades are not a sharp-crested uplift, but a deeply dissected plateau, and that the sharp divide, which parts the eastward and westward flowing streams, is due to the headwater extension of the opposite flowing rivers.

Summary description.—For a generalized view of the northern and central Cascades, therefore, it is well to hold in mind as the leading topographic

*Prepared under the direction of Professor N. M. Fenneman.

feature an elongated, flat-topped dome, about 600 miles long, 40 to 100 miles wide, 8500 feet high near the international boundary, declining gradually to about 4000 feet near the Oregon border, its gently sloping sides merging with the lower regions adjacent on the east and west, its borders crenulated, and its summit crowned with a long line of volcanic peaks, all so completely dissected and sculptured by river and ice, as to produce the most beautiful mountain scenery the continent affords.

Northern subranges described.—The wildest and most picturesque scenery of the Cascade Mountains is found in the triple set of subranges in which the range terminates on the north. Here the mountains reach their greatest development. They rise to uniform elevations of 8500 to 9000 feet, into the region of perennial snows. The scenery is typically Alpine. The deep and complete dissection of these subranges is due to the rapid descent of the streams that leave the crest, and which, throughout the greater part of their length, flow through deep canyons, which at many places are so narrow as to barely permit the passage of the streams. Precipitous slopes prevail everywhere and much of the region is impassable even to prospectors. Between the canyons stand the sharp, serrate ridges with their high, jagged, pyramidal peaks. These "Matterhorn" peaks are the result not of stream erosion, but of the headward extension of the glaciers whose remnants, even now, linger in protected spots.

The main range.—The same rugged topography found along the northern border is continued in the main range and in the higher portions of the subranges found along the border as far south as Wenatchee. (Lat. 47°30′). These ridges represent secondary elevations whose trend is almost at right angles to the main range. Altitudes here vary from 4000 to 8000 feet. In the higher parts, dissection has attained maturity. The valleys are deep and canyon-like and the divides narrow. Sharp peaks and pinnacles, steep slopes ending in glacial amphitheatres, still occupied by glaciers, and wild, cascading streams are characteristic of this section of the range.

The southern half.—Farther to the south, the topography becomes more subdued. Elevations of 5000 to 6000 feet are reached near the divide, but out upon the flanks of the range, they rarely exceed 3000 feet. On the higher slopes, near the crest of the main range, where precipitation is comparatively great, erosion has been active and has produced rugged mountains, but out near the borders, where uplift was not so great and precipitation scanty, the ridges are broad and featureless in detail. The gulches that score the sides are barely noticeable in general view. The long, gentle slopes present an almost unbroken sweep from the broad, even-topped crests to the adjacent valley floors. Such scenery is typical of the east side of the Cascades in Oregon.

History

Geologic history.—The history of this great mountain range is an interesting one. Its birth probably dates back far in geologic history. The

events of greatest interest, however, occurred in comparatively recent geologic times and began with the great eruptions which completely covered northern California, with most of Oregon and Washington (as far north as the parallel 47°30′) with a series of lava sheets averaging, perhaps, 2000 feet in thickness. This period of igneous activity and base-leveling seems to have been followed by an epoch in which the lava sheets together with the region of older rocks north of the above mentioned parallel were uplifted, and it is to these mountain building movements that the Cascades owe their present elevation.

Character of uplift.—As has been noted, this uplift was not of a broad, general nature, resulting in a great, flat-topped anticline with gentle slopes, but was effected with local warpings along the margin, which resulted in the series of parallel ridges found along its borders. This complex warping was no doubt occasioned by north-south and east-west pressure brought to bear simultaneously upon the great block of the earth's crust involved.

River history.—Evidence that the main drainage lines of the region were established previous to the initiation of the present relief, is abundant. In Washington the Yakima River crosses not one, but several of the high, eastern subranges, in a deep canyon in which the original meanders of the stream are well preserved. The Skagit River crosses the higher portion of the main range near the Canadian boundary in one of the narrowest, deepest and wildest canyons of the continent, while the Columbia has not only maintained its course across the eastern subranges, but has cut its way through the Cascade Range cleaving it from summit to sealevel. The Frazer River of British Columbia and the Pitt River of northern California also pierce the main range on their way to the sea. That the courses of these streams were established upon the Cascade lowland cannot be doubted. Not only do they furnish conclusive evidence of the lowland ancestry of the Cascades, but they throw an important light upon the rate of uplift, showing that warping must have been effected at a rate which permitted these master streams to maintain their courses without change.

Partial cycles.—For a complete understanding of the sculpturing of the Cascades of today from this great, diastrophic plateau, it is necessary to trace, briefly, the various stages of its topographic development. Uplift inaugurated a new cycle of erosion, gave opportunity for new streams to form and intrench themselves. That warping was arrested and halted for a long period is indicated by the broad, open valleys with rounded intervening ridges produced during this time. This was followed by a renewal of uplift, upon which the streams, now rejuvenated, began cutting their channels deep into the uplifted mass. The canyons to which the Cascades owe their wild, rugged and picturesque beauty were carved during this epoch. The relative position of the features produced during these early stages can be seen very clearly in the Columbia Valley just north of Wenatchee. Here the valley consists of two

parts, a deep, inner canyon and a broad outer valley, which opens gradually onto the old plateau surface, above which rise the residual hills or monadnocks.

Glacial period.—The canyon cutting stage was brought to a close by a great climatic change which led to vast accumulations of snow in this region. There is abundant evidence that great glaciers formed in the elevated plateau region of the Cascades, from whence they flowed eastward and westward through previously excavated valleys. Though of great size, these were truly Alpine glaciers. The sharp peaks, the hundreds of amphitheatres with their precipitous walls, the many lakes, the U-shaped valleys, the deserted stream channels or coulees, the moraines, all are the result of this ice invasion.

Perhaps the most noteworthy feature in this connection is Lake Chelan, a narrow river-like sheet of water, 65 miles long, located on the east side of the Cascades in northern Washington. This lake is situated in the heart of the highest mountains and is fed by the glaciers lingering on their slopes. At its northern limit it is barely 2 miles wide and for many miles southward steeply sloping walls 5000 to 6000 feet high rise abruptly from the clear blue waters. Farther south, its width increases to three miles and the landscape becomes more subdued. Its surface is only 1079 feet above sea level, yet soundings have revealed depths of 1419 feet, showing that in such places the bed of the lake is 340 feet below sea level.

It is believed that in pre-glacial times, this great gash in the earth was a stream canyon of ordinary depth. Glacial effects in this vicinity testify that ice from an area of about 350 square miles, found its way into this narrow valley. It is to the concentration and corrosive action of this ice, known to have attained a thickness of 1000 to 5000 feet, that the marvelous depth of the valley is attributed.

As this glacier slowly melted back it left a terminal moraine across the entrance of the valley where Chelan City now stands. With its retreat came the gradual expansion of the lake, which now occupies the Chelan Valley.

Volcanic peaks.—In addition to the leading topographic feature due to uplift and dissection, there are the prominent individual ice-capped peaks that rise far above the dark, coniferous forests and add so much to the scenery of this region. Some of these, like Mt. Stuart, are monadnocks, remnants upon an older topographic surface, but the long line of individual peaks found along the summit of the range is of volcanic origin. Enumerating them in order from north to south the principal ones are: Mt. Baker, 10877 ft.; Glacier Peak, 10436 ft.; Mt. Rainier, 14525 ft.; Mt. St. Helens, 9750 ft.; Mt. Adams, 9570 ft., in Washington, and Mt. Hood, 11225 ft., Mt. Jefferson, 10220 ft., Mt. Mazama, 8220 ft., and Mt. Pitt, 9760 ft., in Oregon. These peaks, it is thought came into existence after the time of uplift, and are therefore, of later date than the range itself. All were built by the accumulation of viscous lavas, volcanic ash and other ejecta about old centers of volcanic disturbance.

The most unique of these is Mt. Mazama, of southern Oregon. This mountain represents a truncated cone in the top of which there is an immense depression now occupied by the waters of Crater Lake. The almost vertical cliffs which surround it rise to elevations of 2000 ft., and the maximum depth of the lake is almost as great. It is believed that this peak once reached an elevation of at least 15000 feet, and that it was then an active volcano with a summit crater filled with lava. It is thought that at a later period, the lava found distant means of escape, and that the support of the lava being withdrawn from the crater walls caused the summit portion of the mountain to sink in. That the summit was engulfed and not blown away by explosions is proved by the total absence of fragmental material on its slopes. That volcanic activity as resumed again later is recorded in the presence of Wizard Island, a secondary crater or cone, raised within the main cavity.

Climate

Climatic contrast.—The great belt of mountains thus produced is by far the most pronounced physiographic feature of both Washington and Oregon. Lying, as these mountains do, directly in the path of the prevailing westerly winds, they exert a powerful influence upon the climate of the region. Their eastern and western slopes, as well as the eastern and western divisions of the states through which they pass, differ widely in their general climatology, the eastern exhibiting an almost arid climate with extremes of temperature, while the western is wet and equable.

Precipitation.—The chief source of rainfall in the Pacific States is evaporation from the Pacific Ocean. As the moisture laden westerlies move eastward, they are forced upward along the western slopes of the Cascades, where the air is cooled, largely as a result of expansion. This increased cooling causes a gradual increase of precipitation along the western slopes. In the north, the annual precipitation increases gradually from 45″ near the base of the range to 100″ at the summit. In Oregon, increase is also noticeable, but it reaches little more than 50″, due to decrease in elevation. In descending the eastern slope, the air steadily advances into a region having greater capacity for moisture, and so condensation and precipitation decrease rapidly. In the Columbia Valley, east of the Cascades, the annual precipitation ranges between 10 and 15 inches. The following figures illustrate clearly this rapid diminution of precipitation eastward. At the Cascade Locks on the Columbia near the 122nd Meridian the rainfall is 80″; at Hood River (121°30′) it is 43″, while at the Dalles near the 121st Meridian it is only 16″.

Monthly distribution.—These rains are not evenly distributed throughout the year. 90% of the precipitation occurs during the eight months from October to May inclusive, leaving but 10% for the remaining 4 months. This is due to the fact that in summer the land is warmer than the ocean and the vapor is carried eastward over the mountains for lack of sufficient cooling to condense it. In winter on the other hand, the warm air is cooled quickly in traveling over the cold land mass and the moisture is precipitated.

Contrast in temperature east and west.—The eastern and western slopes also exhibit a marked diversity in temperature. The western slope enjoys the uniformity characteristic of a marine climate, interrupted only by occasional hot or cold winds from across the mountains. The winters are mild, due to the warm winds from the ocean and the heat emitted through the condensation of vapor. This is not true of the eastern slope, for here the climate is subject to sudden changes and to great extremes of temperature.

Resources and Industries

Forests

The main wealth of the Cascade Range lies in its forests. The mountains are included in what may be known as "The Great Forest Belt of the Pacific," which begins in southern California and extends northward to Alaska. It extends up the western slope of the Cascades to elevations of 6000 ft., in the northern and 7000 ft., in the southern part of the range. These forests are continuous through the lower passes far down the valleys on the eastern or sunny side of the mountains. Owing to the equable temperature and abundance of moisture, the densest forests and largest trees are found on the western slope. Below 4000 ft., where the soil covering is thick and exceedingly rich in vegetable mould or humus, and where the temperature is favorable, the trees are so close and the underbrush so dense that travel is well nigh impossible. As higher altitudes are reached, there is a gradual thinning out due to the slight depth of the soil cover and adverse climatic conditions. On the eastern slope, the stand of timber is not nearly so great owing to the lack of rainfall. For the same reason, the density of the forests also decreases southward.

Species.—These forests consist almost entirely of conifers. Owing to the wide range of latitude and altitude the species vary in different places. The western slope is occupied mainly by the red fir, hemlock, cedar, and spruce. Of these the red fir is by far the most prevalent, hemlock being the next most common. On the western slope, in lower latitudes, and on the entire eastern slope where there is a reduction in rainfall, the species are the same but percentages vary. Here the red fir forms but a small percentage of the forests, while the yellow pine, almost absent west of the summit, becomes the predominating species.

Uses of different species.—Of these trees, the fir is pre-eminently useful. It is of greater strength than any of the others and is, therefore, adapted to structural work of all kinds, while the variety of grains and the high finish of which it is capable makes it extremely desirable for the inside finishing of houses, etc. The yellow pine is used extensively in the construction of irrigation flumes and for the manufacture of fruit boxes and crates to supply the demands of the enormous fruit-growing industry of the region.

Logging.—Along low-lying areas, where access is comparatively easy, and along railroads and such streams as lend themselves to the transportation of

lumber, logging has been extensively carried on. Parts of the Cascade forests are, however, practically untouched, due to the lack of transportation facilities.

Forest reserves.—The national government has at length awakened to the economic importance of its forests. It has begun to appreciate that their chief value is not represented in the timber, but in the important relation they bear to the problem of irrigation; in their capacity to store and later distribute the waters, which would otherwise rush to the sea, laying waste the fertile uplands and slopes and destroying the rich bottom lands with floods. That it has entered actively upon the work of conservation in this region is indicated by the continuous belt of reserves found in the Cascade Range.

Agriculture and Fruit-raising

Owing to the extreme ruggedness and the dense forests of this physiographic province, agriculture cannot be carried on extensively, yet it has been practiced with great success in the rich, alluvial bottom lands found along the lower stretches of all the streams. The Yakima, Hood, Kittitas, Entiat and Chelan valleys have become renowned as fruit-raising centers.

Hood River Valley.—One of the best known of these is probably the Hood River Valley almost every acre of which is now in cultivation. The Hood River and its tributaries furnish the water necessary for irrigation and during the fruiting season water is supplied daily in order to force the plants to yield their fullest capacity.

Yakima Valley.—The richest agricultural district of the province is found along the Yakima and a number of the small streams tributary to it. Here the disintegration of the basalt has given rise to soil of wonderful depth and fertility. Through irrigation, this has made one of the most productive regions of the West. One of the largest irrigation projects, involving the irrigation of 100,000 acres of land, is located here. The valley has become famous particularly for its apples, peaches and grapes, although small fruits, vegetables, grains, hay, alfalfa and hops are also raised in great quantities.

Grazing

Grazing is confined chiefly to the open forests of the eastern portion of the range, where the slopes are covered with grass and nutritious forage plants. Succulent herbage is also found in the "burned areas." Cattle, and horses, but particularly sheep belonging to the farmers and ranchmen of neighboring lowlands are pastured here in summer. These sheep are wintered on the bunch grass plains, but as soon as spring comes thousands leave for the mountains, which are reached in early May. Here they remain until the latter part of September. While this sheep pasturing is exceedingly profitable in itself, it is ruinous to the forests and there is a conspicuous dearth of young trees wherever flocks have been summered. For this reason "herding" of sheep has been prohibited in parts of the forest reserves.

Quarries

The Cascade region is also rich in the possession of a variety of rocks suitable for building and monumental purposes. Many of these, however, are in inaccessible places. The only quarries opened thus far are in the immediate vicinity of the railroads. Marble is found in the Northern Cascades but owing to the lack of transportation facilities is little used. Sandstone of commercial value is found along the western border of the range. Valuable granite quarries are found in Washington along the Great Northern Railroad from Index to Leavenworth. Except for the finer varieties used in monumental work, these quarries have enjoyed a practical monopoly of the granite business in the Puget Sound region. Large quantities have here been used for street curbing, monument bases, foundation work for buildings and other purposes.

Mining

Coal.—Mining is rapidly becoming an important industry. The leading product thus far is coal. Coal-bearing rocks are known to occur in many places along the western slopes of the Cascade Mountains. Excellent coal has been found in the Mt. Baker and Hamilton districts near the international boundary. The largest and best coal mines of the province, however, are found east of the Cascades in the Roslyn and Clealum districts. This coal is bituminous, and the mines not only supply Eastern Washington, but a considerable quantity of the coal finds its way to Seattle where large coal bunkers have been built to take care of the export trade.

Metals.—In metal mining the province has barely made a start, but it may some day play an important part in this industry. Gold, silver, copper and lead have been discovered in various parts of the range especially in northern Washington, but owing to the isolation of these deposits, they are necessarily of slow development. With the building of railways into the mining districts this industry will no doubt develop.

Water Power

The factor that will no doubt figure most prominently in the industrial development of this region is the water power, which is greater, perhaps, than that of any other section of the United States. The streams of these mountains possess all the requisite properties for the production of power, an abundant and uniform flow of water and many falls.

The extremely heavy rains, together with the snow which accumulates to great depths during the winter and melts off gradually during the dry summer months, insure an almost uniform flow of water for the large number of streams that leave the crests. That the term "Cascades" is no misnomer, can be seen in the upper courses of all of the streams, for they abound in foaming cataracts and cascades, showing only here and there stretches of more quiet water.

At present, these streams are supplying power for street railways, for electric lighting and manufacturing purposes to the adjacent centers of popula-

tion. Outside the manufacture of lumber and timber products, manufacturing has not yet assumed great importance in this region. Of the 13,125,000 horse power available in the state of Washington only 38,000 horsepower has supplied public corporations; the remainder is undeveloped. The undeveloped power in Oregon is estimated at 3,317,000 horsepower. Considering the cheap power and the almost unlimited resources of forest, mine and soil, together with the new opportunities offered by the opening of the Panama Canal, these states will no doubt, in the near future, become manufacturing centers of considerable prominence.

Transportation

As has been noted, all resources of the Cascade Mountains are practically undeveloped because of the lack of transportation facilities. Yet rapid strides have been made in this direction within the past few decades. Several of the old immigrant roads have been placed in excellent condition. These are now used as wagon roads and are owned and controlled by corporations which exact toll from all travelers. One of these is the old Barlow Road, which leads across the mountains just south of Mt. Hood from the Williamette Valley to eastern Oregon, while another follows the Middle Fork of the Williamette River through most of its extent. In addition to these old roads new ones have been built at great expense. Among the best known are the Snoqualmie Pass Road of Washington, and the Williamette Valley and Cascade Mt. Toll Road which crosses the range at Lat. 44°30′. Another has been recently completed near the international boundary. From these main roads, numerous shorter wagon roads and trails follow the wider divides and the rivers into the heart of the range and are of great use to prospectors, foresters, cattle and sheep men and tourists.

Although the building of these roads has aided greatly in opening up the region, the development of its resources amounted to nothing until the coming of the railroad. Five lines now cross the range, the Great Northern, the Northern Pacific, the Chicago, Milwaukee and St. Paul, the Oregon and Washington R. R. and Navigation Co., and the Portland and Seattle R. R. A comparative study of the activities in the regions adjacent to these lines and the more isolated portions of the range suggests the progress that the building of proposed new lines will inaugurate.

The Association of American Geographers is almost the only geographical society in which membership is limited to technically-trained and scientifically-recognized professional geographers. Its membership is about one hundred. By co-operative arrangement its annual volume is sent to many members of the American Geographical Society in New York, and the monthly *Bulletin of the American Geographical Society* is sent to all members of the Association of American Geographers. The two societies hold a joint meeting every spring in New York City, and maintain a joint Research Committee.

LEST WE FORGET

By E. G. Lange
State Normal School, Whitewater, Wis.

THIS is a day when many subjects and activities are clamoring for the time of student and teacher. Each of the common school branches has something intrinsic to make it worth while. In recent years, especially, courses and subjects have been expanded and enriched for the purpose of making a stronger appeal to students. In high school and college these factors often determine interest to a considerable degree. In the common school, however, the enthusiasm of the teacher for the subject often determines to a large extent whether or not the pupils get much out of the work either in inspiration or knowledge.

Observation has led me to believe that teachers do the best teaching in the subjects about which they know much. When they attempt to teach things which are not clear in their own minds the results are pathetic. Before we can hope for much better results in common school geography teaching we must have enthusiasm for the subject, clear ideas regarding its subject matter, and a wide and intimate acquaintance with the spirit of the new science of geography.

The live teacher of geography in the grades should also be aware of several other important things. Of late the work of enriching subjects has been so assiduously carried on that school people have suddenly concluded that it is again time to apply the knife. Apparently we have been loading pupils with more subjects and at the same time have been adding more and richer stuff to each. All this work has been launched upon the pupil and he has been required to "take it" in the same or shorter time than formerly. This implies not only that pupils of today must have greater capacity but also that teachers must have more ability. Even idealists are now admitting that we have gotten ahead of ourselves in preparing mental rations for the boys and girls. Attempts to do too much have led to a rather thin veneer of knowledge and not much power. As all common school branches are receiving considerable attention with regard to the matter of elimination, so geography will certainly come in for its share of pruning. An interesting report along this line is Bulletin No. 51 (March, 1914) on the elimination of subject matter in elementary schools. It is issued by the Department of Public Instruction, St. Paul, Minnesota.

Occasionally we hear about "crying our own wares." There is plenty of evidence indicating that the geography people who know that there is a new science of modern geography, rich and worth while in content, will have to spread the knowledge of the new and better things in more places, if a wider influence is to be obtained. Certain it is that there are still many, many teachers who have a very imperfect concept of the modern science of geog-

raphy. Custom dies hard. So in our teaching we hold to many things which are no longer of much value in life. Go into our schools and observe the grade work in geography. Too many teachers are still teaching geography very much as it was taught them when they were in the grades. Often this is all the geography that the teacher knows. If the teacher is naturally bright the result is tolerable. Far too often, however, there is mere reading, naming, and memory cramming *and little else*. Emphasis on geographic principles and basal concepts; the evaluation of subject matter; the use of modern text books, supplementary materials, and experience, as sources from which to draw in solving problems; the real meaning of controls and responses; the use of manual exercises,—these and many other phases of work which geography should emphasize do not receive the attention they merit. It is my conviction that we geography teachers have here a problem which demands much more attention than it is receiving.

We may blame ourselves largely for the present state of affairs. We have not been brave enough in carrying the campaign for better things in geography to those who control and do the teaching. We have too long taken for granted that the people who come into our classes for a taste of the subject (and we may as well admit now that the amount of required work in geography will not be greatly increased in the near future), will in some miraculous way get more geographical knowledge and inspiration for themselves. This is likely to prove otherwise. Unless we send out these people with something very definite in subject matter, method, experience, *and especially a concrete, reliable, knowledge of sources from which they may continue to draw after they are out in the field at work*, it will prove true that they will have little enthusiasm for the new geography.

It seems especially desirable that we require more in the way of helpful books and periodicals which students should purchase for themselves. Right here is where our system of free text books in institutions makes for one weakness. *The students have too few good books and periodicals of their own when they go out into the field to teach.* Too often there is a limited supply in the school library. Think of the splendid articles and books that have recently appeared and which emphasize the essence of the new geography. Yet how many grade teachers own and use even a limited number of these good things? Such useful volumes on the teaching of geography as those by Sutherland, Dodge & Kirchwey, McMurry, Holtz, Charters and others, should be more largely owned and studied by those who wish to be qualified to teach geography in the schools of our land. How many take even one strictly geographical magazine or consult one regularly? To what extent do our teachers attempt to make a larger use of the almost limitless geographic material in the daily papers and standard magazines? To what extent do they make use of exhibit materials? Why not require that some of these good things become the property of those who expect to teach geography? Preachers, physicians, and lawyers very generally own libraries, why not more of this for grade

teachers? It has been held that it is unreasonable to ask professional students to buy books and magazines on geography because they cost money and because the vast majority of our teachers are only transients and will remain in the profession a very short time. Is this a very strong argument?

Just now the whole world is studying its geography lesson because conditions have made it desirable to know something about countries and people. What are our schools doing to make this more effective?

Lastly, if the leaders in geography do not believe in the subject with sufficient enthusiasm to keep pounding away, even more vigorously, for the rich new science of geography, we need not expect that better results will soon be produced in the school rooms where most people must continue to get much of the geography which they take into life.

ALUMINUM

By M. G. Edwards

Case School of Applied Science, Cleveland

ALUMINUM is the most abundant and widely distributed metal in that portion of the earth available to observation. It is known to exist in over 200 different minerals and in practically all rocks. It forms twenty-one per cent of pure clay and one writer has estimated that in a cubic yard of clay there exists about 800 pounds of the metal. It is only within comparatively recent times that aluminum in its elemental state has ceased to attract wonder.

Properties.—Aluminum is a tin-white, lustrous metal resembling silver. It is malleable, ductile and sectile. It takes a brilliant polish and may be rolled or beaten into thin leaves. Cast in bell form its sound is short and sharp but in bar form it has a clear, resonant tone. It is a very good conductor of electricity and heat. It is not affected by hydrogen, nitrogen, sulphur or carbon and is scarcely attacked by nitric acid, but it is attacked by chlorine, fluorine, boron and iodine and is readily soluble in hydrochloric acid. It is the lightest of all useful metals, having a specific gravity of 2.58. Its tensile strength is about 35,000 pounds per square inch. It has a melting point of 657.3°C.

Ores of Aluminum.—Due to its great affinity for oxygen, aluminum does not exist in a free state in nature. Like iron, its most important ores are the oxides and hydrous oxides. Its sulphide is not found in a natural state. Only a few minerals have been employed for the production of the metal.

Kaolin ($Al_2O_3.2SiO_2.2H_2O$).—The cost of separation of the alumina from the silica in kaolin by any known process is at present prohibitive. It is probably only a matter of time before a process will be discovered for converting the extensive kaolin deposits into an important aluminum ore. The highly aluminous clays will then be particularly desirable.

Corundum (Al_2O_3).—Corundum is a comparatively rare mineral and is extremely hard. When broken it becomes too valuable as an abrasive to permit its use as an aluminum ore. Certain varieties of corundum are regarded as gems. Ruby is the red variety and sapphire is the blue.

Cryolite ($AlF_3.3NaF$).—Before the discovery of the bauxite deposits of the South cryolite was practically the only aluminum ore. This was brought from the southwestern coast of Greenland. It was first used by soap makers for its soda, and later used in making soda and aluminum salts and a white porcelain-like glass. The metallic aluminum derived from this source was expensive, as the metallurgical process used involved the use of metallic sodium. This in addition to the high cost entailed in importing the mineral caused an almost prohibitive price to be placed on the finished product. The Ivigtut cryolite was valued in 1912 at $80 per ton.

Bauxite ($Al_2O_3.2H_2O$).—Bauxite was discovered in 1821 by a chemist, Berthier, at the village of Baux, Bouches du Rhone, in southern France. These deposits were the first to be worked and from them the mineral receives its name. The deposits are about thirty feet thick and are associated with Cretaceous limestone, sandstones and clays which are distinctly stratified and are thought to represent products of a Cretaceous lake.

Bauxite occurs in many localities in Germany. At Vogelsburg the mineral occurs in masses, embedded in clay with which is associated masses of iron ore. It appears to be a direct residue from the decomposition of basalt. In Glenariff Valley, Ireland, the bauxite deposits are associated with volcanic rocks and are believed to be derived by the decomposition of rhyolite or rhyolite ash.

Bauxite was first discovered in America in 1887 near Rome, Georgia. This discovery was followed in 1891 by the discovery of the mineral in Alabama and Arkansas. The latter state is the greatest producer in the United States at the present time. The discovery of the New Mexico deposits followed in a few years but these deposits have never been worked because of their inaccessibility. They also appear to be derived from the decomposition of basic volcanic rock. Still later, bauxite in commercial quantities was found in Tennessee on the east side of Missionary Ridge, near Chattanooga. Active mining has been going on continuously for many years. No other deposits of commercial importance are at present known in the United States.

Alunite ($K_2O.3Al_2O_3.4SO_3.6H_2O$).—Recent studies of the alunite deposits of Marysville, Utah, Rosita Hills, Colorado, and of other western states by the United States Geological Survey indicate that alunite may become an important source of aluminum in the future. Although it has heretofore been regarded valuable as a source of potash, it should by no means be ignored as a possible source of aluminum.

Production.—The remarkable increase in the production of aluminum is shown by the following table which gives the production in pounds for every fifth year since the beginning of the industry in 1883.

1883	83 pounds
1888	19,000 pounds
1893	333,629 pounds
1898	5,200,000 pounds
1903	7,500,000 pounds
1908	11,152,000 pounds
1912	65,607,000 pounds

The total production between 1883 and 1912 was 305,358,779 pounds. The value of the domestic consumption of the metal in 1912 was $11,907,000. In the same year the value of the exports of aluminum and of the manufactures of aluminum was $1,347,621. In order to supply this rapidly increasing demand for the metal there was mined in the United States in 1912, 159,865 long tons of bauxite valued at $768,932.

Metallurgy.—In the early part of the nineteenth century, Oerstad suggested a process for obtaining the metal aluminum by treating the chloride with an alkali metal. This suggestion was adopted by Wohler in 1827 when he isolated aluminum for the first time and determined some of its physical properties. This process was later modified by Deville who in 1855 exhibited a bar of the "silver white metal made from clay" at the Paris Exposition. At the time it was considered one of the chemical wonders of the age. It sold for $15 an ounce.

The cost of the metal was rapidly reduced by improved metallurgical methods, so that in 1884 Colonel Frishmuth who cast the tip of the Washington Monument furnished the metal at $15 a pound.

Electrolytic processes were then devised of which the Cowles Brothers process, the Hall process and the Hiroult process were the most important for many years. Alfred H. Cowles has recently patented a process for the extraction of alumina from clay. In 1912 a process was patented for the extraction of alumina from silicates like the feldspars.

The manufacture of metallic aluminum as carried out at present by one of the largest companies is as follows: The aluminum is obtained from bauxite by dissolving the mineral in caustic soda and precipitating it by the addition of some previously precipitated alumina. The alumina is then filtered off, washed, dried, calcined and taken to the electric furnaces. The molten electrolyte consists of alumina and its flux, cryolite. Aluminum is reduced at the point of contact of the carbon anodes which oxidize and burn away, the gases going into the atmosphere. Hydrofluoric acid gas is evolved from the cryolite. The aluminum sinks to the bottom of the furnace and is tapped off.

Uses.—The first article ever to be manufactured from the pure aluminum was a rattle for the young Prince Imperial of France in 1856. At first it was confined largely to jewelry, medals, and inlaid work. On account of its extreme lightness it became valuable for sextants, eye-glasses and telescope tubes. It found a frequent use in the manufacture of delicate weights, fine wires,

and beams of balances. In 1862 culinary articles made from aluminum were displayed at the London exposition, but for practical use in the household the cost at that time was prohibitive.

Its days of limited usefulness are at an end. Today it finds a wide application in the arts and manufactures. It is extensively used in the purification of iron and steel. It is replacing copper and brass wherever lightness is a desirable feature, as in bed plates for torpedo boat engines, internal fixings for ships, motor car parts, and in chemical works. It is especially desirable in the manufacture of camp equipment where its lightness and non-corrosive qualities make it doubly valuable. For army use it has had a wide application in several countries along lines of marine engineering, as shells for cartridges, and in drum heads. European powers have equipped their soldiers with it in the present war wherever possible.

Aluminum is at present being used in the New York telephone and telegraph wires and giving satisfactory service under all weather conditions. In Chicago some of the electric lines are of aluminum and here again it has justified its use. The new transmission line which carries power to Los Angeles over a distance of 275 miles is of the same metal. Aluminum has an electrical conductivity double that of copper per pound.

Aluminum combines readily with a number of other metals to form a large series of useful alloys which gives it a still greater range of usefulness as it combines the lightness of aluminum with greater strength and hardness. The aluminum bronzes, composed of varying proportions of aluminum and copper are the most important of these alloys. One of the aluminum bronzes has a tensile strength as high as forty-one tons per square inch which makes it desirable for machinery, propeller blades, and for castings of heavy guns.

With the discovery of large deposits of rich aluminum ores and the perfection of metallurgical processes by which cheap extraction is possible on a commercial scale, the metal has ceased to be a chemical curiosity and is rapidly coming to be regarded as a household necessity.

SOME VALUABLE GOVERNMENT REPORTS

Special Consular Reports: "Australia"—No. 47; "The Railway Situation in China"—No. 48; "Cocoa Production and Trade"—No. 50; "New Zealand"—No. 57; "Russia"—No. 61. May be obtained by addressing the Bureau of Manufactures, Dept. of Commerce and Labor, Washington, D. C. The Bureau of Fisheries of the same department has issued "The Fisheries of Alaska" (Document No. 730), "The Fur-seal Fisheries of Alaska" (Document No. 735), "The Fisheries and Guano Industry of Peru" (No. 663), "Sponge Culture" No. 670), "The Fisheries of China" (No. 664), "The Fisheries of Japan" (No. 665).

A STUDY OF GEOGRAPHY IN NORMAL SCHOOLS*

IN order to make a comparative estimate of the geography offered in the public normal schools of our country, a study was made of the work in one hundred and forty-four schools of this class. . . . In the 144 schools studied, geography is offered in some form in 131, and is required in some quantity in 103. In 109 schools offering a two-year course beyond a high school, geography is required in varying amounts in 78. Of the 13 schools making no mention of geography five offer courses in geology, of which one offers eight courses in geology.

In the 109 normals offering geography in some form, no electives are offered in 55. The maximum requirement found was three courses, five hours each for a half year; the minimum was 30 hours and the average perhaps 100 hours. . . . The following table showing the offering in ten schools requiring high school graduation for admission to a two-year professional course will indicate the variety in the geography opportunities. The details here shown are taken at random . . . :

Amount of Required Geography	*Nature of Work Required*	*Geography Electives Offered*
1 term	Methods	Geography and physiography.
1 term	General geography, methods	North America, Eurasia, commercial geography
100 hours	Principles	Methods, local geography
0		Political and physical geography
¼ year	Physical geography	0
2 courses	Physical, economic and regional	Physiography, agricultural geography, principles, methods, Europe, economic geography, social and historical geography
16 weeks	General and physical	0
2 hours, ½ year	Not stated	Map drawing, methods, North America, regional geography, physiography, meteorology, economic geography, Europe
4 hours, 1 term	Physiography	General geography, social geography of North America, of South America, of Europe, state geography, commercial geography, geography and American history
0		Industrial geography, physiography

A summary of the work throughout the country indicates that the amount of training in geography is, in general, inadequate in quantity, and often in quality, as a preparation for teaching one of the five fundamental subjects in

*Abridged from a paper by Professor R. E. Dodge in the Teachers College Record, Mar. 1914.

the elementary schools, at least to one especially interested in geography. This inadequacy in quantity is recognized by many enthusiastic teachers of geography and by some administrative officers, but the interest in improvement is not general. . . .

From one of the more progressive normal schools of the country comes the statement that for high school graduates "one term of geography"—so called "review," is required. "This course combines the work of method and subject matter, dealing with the elements of geography, with which we spend the larger portion of the term. While our students come from high schools, about forty per cent of them have had no geography whatever beyond the seventh or eighth grade."

From one of the states most widely known and praised for its excellent work in normal school geography, some illuminating facts have recently been given as to the geography preparation at admission and at graduation from three large normal schools. Of 1678 high school graduates admitted to these three schools, 28 per cent had no geography in the high school, 34 had one-half year's work, 30 per cent had one year's work, and 8 per cent had one and one-half year's work. Of 648 graduates from these normal schools graduated with life certificates, 41 per cent had no geography work while in training, 42.3 per cent had one twelve-weeks term, 12.5 per cent had two terms of the same length, 2.3 per cent had three terms, 1.3 per cent had over three terms.

The general deficiency in geographic training of senior students in normal schools is recognized in many localities, but not generally so. One large normal now requires the passing with high standing of an examination in locative geography before admission to the senior year, thus indicating that others besides the geography specialist recognize the general need of a knowledge of the A B C's of ordinary school geography.

However unsatisfactory may be the time given to geography in normal schools, the use of the time available is even more discouraging when the field as a whole is viewed. Of the required courses in geography given in the schools studied, 38 are physiography, 9 are commercial geography, 66 are methods, 29 are "geography," 48 are regional geography and review, 5 are principles, 2 geography and history, 1 is map drawing, and 3 are geology. Or of the 200 courses in geography, 50 are high school in type, and 140 are either methods courses or regional courses. Of the latter, the larger number are merely review courses of elementary school geography, as the description of text-book used will indicate.

Of the elective courses offered in the two years' normal courses, numbering in all 162, 41 are physiography (5 advanced in type), 27 are commercial geography, 25 are methods, 9 are "geography," 6 are entitled principles, 6 are rural school geography, 42 are regional geography, largely review courses, 4 are geography and history and 2 are devoted to map drawing.

The emphasis is given in the large to a review of the elementary facts of geography which form the larger portion of elementary school courses, and to

methods of teaching in elementary schools. With this limited attention to geography in our normal schools, and with the work, except in a few shining instances, either high school physiography, methods or review of elementary texts, is it any wonder that geography is so widely considered merely a children's subject that has not grown up? In a few institutions slowly but surely increasing in number, specially trained teachers are giving work in geography of very superior quality. They are the beacons that are pointing the way to the more conservative schools on the one hand, and, on the other, to the newer institutions in which the requirements in education are so great that a serious study of the materials of the elementary subjects is impossible. . . .

The causes of these conditions are many. In the first place, educational theory and practice, as important to the prospective teacher as is the knowledge of materials, in many institutions are over emphasized, and little time is left for the study of so-called academic subjects, other than from the bread and butter point of view. In the second place, pupils who enter the normal schools from a high school course have, as a rule, no knowledge of geography beyond that gained in the sixth or seventh grade of the elementary schools. Elementary school geography is rightly, and probably will remain, largely regional geography with an increasing emphasis in the higher grades of causal regional geography, culminating in a study of the reasons for economic and social conditions. High school courses of study in geography are usually specialized courses in physical geography or physiography, or in commercial geography. Thus the geographic training of the prospective teacher, on admission to the normal school, has been away from the field of elementary geography, and the normal school teacher of geography must bridge the gap as effectively as his limited time will permit.

Three methods of procedure are possible. The easiest for the teacher not trained in higher geography, is to review the details of elementary school work, as is so frequently done. The pupil-teachers thus go out to their work with a preparation little beyond that of the uppils in the upper grades and rarely with any new point of view that will make it possible for them to vivify a subject deadened by a mass of detail. The margin of safety of the young teachers is slight, the ice is always thin, and they naturally expose themselves to the dangers of the subject as little as possible.

The second plan, the systematic, is to organize the normal school work so as to treat in turn the underlying principles of geography, some special continent from a causal standpoint, and methods of teaching geography in elementary schools. . . .

The revivification of school geography, long misunderstood and unappreciated because so largely devoted to detail in memorizing myriads of items, all of questionable permanent value, depends upon the right point of view on the part of the normal school teachers. If the best training in geography is that which gives the students the best knowledge of essentials, and the best power to organize and evaluate details, the method of study to be followed in

normal schools is that which will give the best outlook upon the field, and best awaken the mind of the pupil to the opportunities in geography and to its problems. . . .

GEOGRAPHICAL CONSIDERATIONS IN SELECTING THE SITE FOR THE NATIONAL CAPITAL

IN the opening chapter of his recent book, *A History of the National Capital* (Macmillan, 1914) Mr. W. B. Bryan says: "A vital consideration in selecting the location of the seat of government of the United States was convenience of access to all portions of the country. It was to be central as to population and territory. Moreover, it was to be on a navigable river connecting the Atlantic on the one side with the great western country on the other." Geographical considerations were the dominant ones all through the 10 year period of discussion and wire-pulling which culminated in the selection of the present site of Washington. The New England colonies and the colonies south of Virginia recognized that, on geographical grounds, they were ruled out. Each of the middle colonies strove energetically to persuade congress that it contained the one and only spot, predestined by nature for the National Capital.

Nine days after the preliminary articles of peace were signed in Paris, Kingston on the Hudson began a movement to have itself selected for the honor. A few months later, Annapolis, Md., proceeded to offer land to congress for a federal district. Within another month, the New Jersey legislature offered land and money for the same purpose, recommending a site at the head of navigation of the Delaware, near Trenton. Virginia quickly followed with an offer of the town of Williamsburg, including a gift of the then existing "palace," the capitol, all of the public buildings, 300 acres of land, and money not to exceed 100,000 pounds for the erection of thirteen hotels for the delegates in congress. Virginia also offered to unite with Maryland in ceding land on opposite sides of the Potomac. Congress, however, took no definite action for several years.

Throughout the protracted discussions, three conditions were always held to be essential: (1) the national capital must be geographically central; (2) it must be on a navigable river heading in the West; (3) it must not be near enough to the coast to be in danger of a sea attack.

The choice gradually settled down to possible sites on the Delaware, Susquehanna, and Potomac. At one time the plan of having two capitals, to be used alternately, was considered. Another plan was to place the federal district well up the Potomac in the narrow neck of Maryland, where it should be very near to both the Virginia and the Pennsylvania boundaries, thus satisfying the ambitions of three states. The formation of the Potomac Company for the purpose of improving the upper river for navigation tended to increase the claims of that river.

In 1789, the House of Representatives after prolonged debate, selected the falls of the Susquehanna as the site, but the Senate rejected it and voted for Germantown on the Delaware. In 1790 the Senate, by a vote of 14 to 12 and the house by a vote of 29 to 22, selected the Potomac, and specified that a site should be chosen somewhere between the East Branch (the southern boundary of the present city of Washington) and the Connogocheague, 67 miles up the Potomac. President Washington himself, after going over the entire ground and after receiving the petitions of the various rival towns within the limits, selected the Georgetown site, the present District of Columbia.

It is an interesting fact that two of the points most insisted upon—centrality, and position on a navigable river leading to the Atlantic and heading in the West—were advantages of only a temporary character, for the site soon ceased to be central, and the Potomac, as a navigable waterway to the West, was a commercial failure. R. H. W.

RECENT PUBLICATIONS

ATLAS DE LA PLUS GRANDE FRANCE; Geographique, Politique, Economique, Departmental. By Onesime Reclus. 160 colored plates, 160 pages of text. 70 francs, unbound. Attinger Freres, Publishers, Paris, 1914.

The material and organization of this atlas make it a model for use in regional geography. The plates and type pages are 8 by 11 inches. Each plate is provided with an adjoining page of explanatory text containing an average of three black-line diagrams or sketch maps.

The first twelve plates and pages of text are devoted to general considerations covering the distribution of French possessions and the climate, stream regimen, natural regions, geology, political divisions, social, economic, and military conditions of France.

Plates and pages 13 to 56 inclusive give a more detailed description of France based on ten somewhat arbitrarily chosen regions. Taking the "Central Region" as a type, one finds a topographic map (scale 1:1,500,000) with a page of text discussing the topography and geology, the climate, hydrography, population, and natural resources. For greater detail the region is then divided into a northern and a southern section. For each section is shown a map (scale 1:1,300,000) of agricultural and mineral production and one of industrial and commercial conditions. A page of appropriate discussion for each plate covers similar topics. Thus for this central region there are five plates and five pages of description.

Plates 57 to 143 inclusive are devoted to maps of the 87 "departments" of France. (Scale 1:500,000). These maps are sufficiently detailed to show not only the "Arrondissements" but the "Cantons." Light shading indicates the topography and appropriate symbols show the distribution of forests, the political status of the cities and villages, the ownership of the roads, and the relative importance of the railways. Tramways, canals, and navigable water-

ways are also indicated. Actual elevations in figures are placed at frequent intervals. The accompanying page of text treats the Department in each under the following headings: Geology and topography, Stream courses, Climate, Population, Administrative divisions, National defense, Justice, Public instruction, Religions, Agricultural and mineral products, Manufacturing industries, Commerce and Transportation routes. The emphasis is usually placed on the geology, topography, hydrology, productions, and industries. These descriptions are amplified by diagrams showing the percentage of population engaged in various occupations, the proportion of cultivated to pasture and forest land. Sketch maps and cross-sections showing local details of topography and geology and agronomy are numerous.

The atlas is complete in twenty sections, eighteen of which are now published. The two remaining sections, plates 145 to 160, are to cover the foreign possessions of France. They are withheld from publication until the close of the European war.

The engraving and coloring of the plates are admirable, as are the schemes for showing distribution and percentages. Adverse criticism must be limited to the statement that some of the maps, particularly those of production and industry for the ten regions, are made to show too much. It will doubtless be many years before anything of comparable excellence is published for the United States. V. C. FINCH.

ALASKAN GLACIER STUDIES, by Ralph S. Tarr and Lawrence Martin. Published by the National Geographic Society, Washington, D. C., 1914. $5.00.

Outside of the Polar regions, characterized especially by vast blanketing sheets of glacier ice, there is no region which can vie with Alaska either in the size or in the wide range of variety of its existing glaciers. The scientific exploitation of this field, it is pleasant to record, has been almost exclusively the work of American glacialists, who have thus added greatly to the world's knowledge of glacier phenomena. The National Geographic Society, which has largely financed the more recent glacial exploration of the region under the direction of Professors Tarr and Martin, is to be congratulated upon the appearance of a comprehensive report in which the scattered data from a number of preliminary and special studies have been brought together and supplemented by considerable new material. The volume is fully, though not sumptuously, illustrated, and the use of half-tone and the quality of paper and binding would indicate that it is designed for rather wide distribution rather than for the book collections of the dilettante. About one half the volume appears under the joint authorship and is devoted to the glaciers of the Yakutat Bay region at the base of Mount St. Elias, whereas the last twelve chapters have been prepared by the junior author since the much lamented death of Professor Tarr, and treat of the glaciers of Prince William Sound and the lower Copper River.

It is obviously beyond the limits of this review to attempt a summary of the contents of the volume, which to a large extent is given over to a discussion of glacier characteristics and the evidence of changes in the glacier fronts since they were first visited by travellers.

The classification which the authors adopt goes out from the idea that it is necessary to retain in scientific nomenclature all the individual names which have in the past been somewhat indiscriminately applied to different parts of the same glacier mass, even where one name may apply to the head and the other to the foot of the same stream. It does not seem likely that such a classification will long endure. One type which the authors first described from the Alaskan region, and which appears to have a wide application, is what they call the "through glacier"—a moving body of glacier ice which like a saddle crosses a divide to dissipators on either side. Another large contribution of the authors, though it has likewise found publication before, is the relation which they appear to have established between earthquakes and sporadic advances in the glacier fronts which are sudden and short-lived, and which are delayed by periods dependent upon the length of the glacier streams.

The volume contains in a pocket a map of Alaska showing the distribution of its glaciers, and a number of special maps which present the work of accurate surveys carried out in connection with the several expeditions. In addition to the specialist upon glaciers, the book will be widely read by those having interest in travel, and many will regard it as unfortunate that the book has not been given a somewhat more attractive dress. The frontispiece in particular might well have been reproduced in lithograph instead of by the cheaper and unsatisfactory half-tone. Notwithstanding shortcomings of this character the volume is a valuable one and one which must frequently be consulted by the student of glaciology. WM. HERBERT HOBBS.

THE GEOGRAPHER

THE geographer is expected to have more than a superficial acquaintance with most subjects and to be deeply versed in many. Tack the title geography onto any subject relating to man or the surface of the globe, and the unfortunate geographer is expected to be ready to expound it. Any aspect of knowledge is supposed thus to become a part of geographical study. Call astronomy astronomical geography and the geographer is at once expected to be versed in the relationships of bodies in space to one another; yet that is not geography, nor, to be precise, is surveying. The economist demands that the geographer shall be a student of the principles of economics and shall discuss tariffs and bounties and other man-made institutions, but that is not really the business of the geographer. Then, to crown all, the geographer is looked to for that anomalous subject known as historical geography, which is neither one thing nor another, but as expounded in most text-books is more history than geography, because it simply describes the place where certain events occurred. The geographer is not omniscient, and he has his limitations like most other people.—[R. N. R. Brown in *Scot. Geog. Mag.* Sept., '14.]

THE COLORADO GEOGRAPHIC SOCIETY

ON October 28, 1914, at the invitation of the Governor of Colorado, a convention of nearly a hundred of the state's representative citizens met in the Senate Chamber of the Capitol in Denver to consider ways and means of supervising and clarifying the geographical names of Colorado, of collecting and preserving the historical associations of towns, streams, mountains, highways, passes and other geographical features of the state, and of eliminating duplicate or otherwise undesirable names.

As a result of the convention, the Colorado Geographic Society was organized and a committee was left in charge of the details of organization. This committee has incorporated the Society, to which any reputable person interested is eligible. The government of the Society is vested in the Advisory Committee, now in process of formation, to consist of about thirty citizens representative of the various localities, and of the geographical interests of the state. The Advisory Committee selects, with the Governor's approval and designation, a group of five, to be known as the Colorado Geographic Board. This Board is the actual working arm of the Society; but all its findings are to be referred to the Advisory Committee. It is hoped thus to combine the efficiency of a small working body with the wisdom of a large representative one.

GEOLOGY AND GEOGRAPHY

PHYSICAL geology was born under the name of physical geography. The christening was unfortunate, for in those days geography was exactly what the derivation of the word suggests, a description of the earth, while the new subject was from the beginning strictly an interpretative one. However, the mistake was made, and physical geography, so called, is in consequence popularly looked on as within the province of the geographer. The development of the race is here comparable to that of the individual, insomuch as the most capable, perhaps the only really capable, exponent of that subject must be the geologist. The geologist, like every other scientist, has his definite outlook, which he is often unable and seldom willing to transgress. Consequently, though we find the geologist passing through physical geology to geography he stays his interpretation of nature on that plane. It is a perfectly intelligible outcome when the evolution of the subject is considered. Most geographers of this physical school reached their geography through a thorough steeping in geological science. Hence they see the world from a definite but purely physical standpoint and fail to give due recognition or prominence to non-physical or animate phenomena."—[R. N. R. Brown in *Scot. Geog. Mag.* Sept., 1914.]

The JOURNAL of GEOGRAPHY

Volume XIII MAY 1915 Number 9

A VISIT TO THE AVEZZANO EARTHQUAKE ZONE

By E. V. Robinson*
University of Minnesota, Minneapolis

ON January 13, about 8 a. m. a sharp earthquake was felt throughout central Italy. Rome itself was shaken. A statue fell in St. John's Lateral, new cracks appeared in the column of Marcus Aurelius and minor signs of strain appeared in other places; but little real damage was done in the city and no one was hurt there. One gentleman, indeed, who happened to be shaving when the shock occurred, assured the writer that he had a narrow escape from cutting himself; but he likewise remarked sarcastically that he had no idea how severe the shock had been in Rome until several weeks later, when he received the New York papers. The first reports from the country districts also indicated more alarm than real damage, but late that night it became known that several towns located 75 to 100 miles east and northeast of Rome had been almost completely destroyed.

At first the government was indignant that the responsible local officials had not promptly reported the facts, and it is whispered in Rome that a decree was even prepared removing one of the mayors from office for such neglect of duty. As it happened, however, it proved impracticable to serve notice of removal, for the reason that the mayor in question, together with most of his fellow townsmen, was dead. As soon as the magnitude of the disaster dawned on the public, troops and physicians were hurried to the stricken district. Owing to the complicated international situation, the government announced that foreign contributions would not be accepted, but funds were promptly subscribed in Italy and various relief agencies set in motion.

On February 11 the writer reached Rome and on February 15 went with a party of four, by motor car, to Avezzano, located some 70 miles by road east of Rome. The road (substantially the ancient Via Valeria) follows the valley of the Aniene through Tivoli and up the western slope of the Appennines, descending eastward into an extensive basin without natural outlet. This basin formed the stronghold of the ancient Marsi, who gave the Romans such a severe tussle and later furnished the best recruits for the Roman legions. It is interesting to note that the population of that district still impresses one as distinctly superior in a physical way to the people on the low plains. Crossing the Roman campagna, there were several heavy dashes of rain which helped to make the road all but impassable. In fact, two tires exploded during the run out, which delayed the party so much as to spoil the original plan of making the round trip in one day.

Around Tivoli, olive harvest was in full swing, the people singing gaily as they worked. The snow line was, however, reached at no great distance

*Professor Robinson is spending the present academic year in Europe.—*Editor.*

above Tivoli, and over the higher mountains the snow was piled three to four feet deep beside the road. This snow mantle made it impossible to verify the reports of those who had gone over the road soon after January 13, to the effect that much of the roadbed between Tagliacozzo and Cappelle, on the eastern slope, had sunk some 5 or 6 inches, and that at one place a transverse crevice nearly three feet thick had appeared. The latter crevice, if it ever existed, had of course been filled long before this date.

On the way, a sharp watch was kept for earthquake damage, but none was seen until well across the divide and in fact within a few miles of where the greatest loss of life occurred. Notwithstanding the fact that the shock was felt over an unusually wide area, the zone of destruction was thus relatively restricted. The first clear evidence of the earthquake was a shattered farm building on the hills not far from Cappelle, which also lay mostly in ruins. When we reached Avezzano, the streets were filled so high with wreckage, that the car had to be abandoned and further explorations made on foot.

The Terrible Destruction

In this town of some 16,500 inhabitants, only one building over one story survived, and that was of reinforced concrete. A number of the one story structures survived, but in some cases even where the outside walls appeared intact, the interior had been wrecked by debris from the roof and the inner side of the walls. The completeness of the collapse was due in part to the force and duration of the shock (over a minute), and possibly in part to a compound motion, which seems to be indicated by the fact that the four corner posts of some buildings had all fallen outwards. For the most part, however, the heavy mortality was caused by the construction of the houses. Italy lacks coal, which renders structural iron expensive; and the mountains having been long ago deforested, lumber is likewise a luxury, as everywhere in the Mediterranean region. As a rule, therefore, the houses were built of loose stones of various sizes and shapes, without even timber to stiffen the walls; and most of them lacked effective mortar to hold the stones together. As a result, the walls simply crumbled into shapeless mounds of stone and sand, burying nearly the entire population beneath them. At Avezzano, out of the entire population, 96 per cent are estimated to have perished; and some other places were almost as severely visited.

Owing to the nature of the ruins, the great majority were killed instantaneously. In some cases, indeed survivors were released after several days; and one man, imprisoned in a barn where he could reach water and grain, was taken out alive after 25 days, though (it is said) in so emaciated a condition that his sister failed to recognize him. While our party was there, three persons (an entire family) were laid out in plain pine boxes. For some reason, however, the work of excavation seemed to go on in an unsystematic and half hearted way. There is no place near at hand where the debris can be dumped and the mass of it is too enormous to haul far. Already, in one case, a new village site has been chosen, some 200 or 300 metres away from the

old one; and the ruined houses may quite possibly remain the tombs of many of the victims, as happened after the last great shock at Messina.

On the other hand, every effort is made to provide for the living. Everything has to be brought from a distance—tents, lumber for temporary houses, medical supplies and food. Even water comes by rail, all the wells being poisoned by the dead buried in the ruins. To add to the difficulty of the situation, wolves, driven from the mountains by deep snow, and perhaps also attracted, have followed relief parties going into the hills and have even penetrated into Avezzano itself; three have been killed recently in the central park, where the relief work is now organized. Public kitchens have been opened there which provide a wholesome ration. Schools have also been established in rough shacks at Avezzano which have some 50 or 60 orphans each, collected from the damaged villages. These are under the patronage of the queen. In all relief work, the soldiers have taken a leading part, fairly fathering and mothering the dazed and often helpless survivors, young and old alike.

After inspecting these and other relief institutions and photographing some of the ruins, our party found the hour too late for the return trip over steep and winding curves, with a precipice at one side. It was therefore necessary to pass the night at a town (Tagliacozzo) just outside the zone of destruction. By morning some 6 inches of fresh snow had fallen on the mountains, and the car finally stuck fast on a narrow road at the foot of a heavy grade. For a time the situation seemed a bit unpleasant, especially in view of the wolf stories which we had heard the night before. Eventually the car was turned and run back to Tagliacozzo, the party returning to Rome by train.

Possible Causes

The question remains, what caused the earthquake? Everywhere in Italy this has been the chief topic of conversation, forcing even the war into a secondary place. The most popular explanation has been that the draining of Lake Fucino (the Lacus Fucinus which bulks large on ancient maps) has so far changed the stresses in the crust as to cause internal fractures. In order to judge as to the value of this explanation, it may be well to glance briefly at the nature and history of the district in question.*

From geological evidence it appears that even in Roman days, Lake Fucino was a mere shrunken remnant of a lake measuring several hundred square miles which at an earlier period covered also the high plains of Alba and Palentini, until finally the water level fell below the hill of Cesolino, an extension of Mt. Salviano. Being fed by torrents flowing down the inner slopes, the water level was subject to great fluctuations. Thus, it is recorded that the surface rose 9 meters from 1783 to 1816, fell 12 meters from 1820 to 1835, then began to rise again. During periods of falling waters, the lake was surrounded by a zone of marsh, and when the waters rose again, great distress inevitably resulted. For this reason the idea of draining the lake

*Rossi G., *Studi e Ricerche sull'Ex-Lago Fucino* (Portici 1912); also folios 28 and 29 of the *Carta d'Italia* issued by the Touring Club.

originally conceived by Julius Caesar as a part of his plan for making Rome less dependent on Egypt for grain, was taken up again by Claudius who employed some 30,000 men for 11 years (61-52 A. D.) driving a tunnel over 5 kilometres in length under Mt. Salviano into the upper valley of the Liri. This tunnel, later repaired by Trajan and Hadrian, for a time prevented fluctuations of level; but it was not low enough entirely to drain the lake and it finally became choked up. More than a thousand years later, Frederick II. gave orders for clearing out the Claudian tunnel, but it remained for the Bourbon government of Naples seriously to undertake this work (1826-1835). The complete drainage of the lake, first attempted in 1845-48, was finally accomplished under the direction of Prince Alessandro Torlonia (1852-76), by the construction of a new low-level tunnel into the Liri, with an extensive system of collecting canals. The area drained when the reduced lake disappeared amounted to 15,775 hectares, and the cost was something over 3,000 francs per hectare. Incidentally it may be noted that most of the reclaimed land remained the property of the Torlonia family, whose head still represents that district in the Italian parliament. The Torlonia mansion at Avezzano was among those destroyed in the earthquake, burying some 30 persons in the ruins. This recital of facts seems to dispose of the idea that the drainage of the lake caused the earthquake since the area finally cleared of water was too small seriously to affect the crustal stresses; and the work was moreover completed nearly 40 years ago.

Another popular explanation is based on the assumption (1) that the depression formerly occupied by Lake Fucino is the crater of an extinct volcano like the lakes in the Alban hills and elsewhere near Rome; and (2) that the earthquake was due to volcanic forces, long quiescent but not yet extinct. Color is supposed to be given to this idea by the fact that a severe shock occurred in the same general district in 1214, and another in 1885. However, repeated shocks may be due to faulting quite as readily as to volcanic action; and the western Apennines, unlike the mountains northwest and southeast of Rome. The presumption is therefore against vulcanism as the cause, although the snow made it impossible to determine by inspection whether the district offers any evidence of volcanic action.

Scientific writers, on the other hand, have been cautious in assigning reasons, contenting themselves as a rule with pointing out that the superficial area affected was much greater than in the case of the Messina shock of 1908; that the focus of the latter has been located by Oddone at 9 kolimetres beneath the surface; and that the center of disturbance at Avezzano was probably from 20 to 30 kilometres within the crust. Those speculatively inclined add that there was a center of extremely low atmospheric pressure over Italy; that the moon had just reached (on the 12th) the point in its orbit nearest the earth; and that at the same time the sun showed a particularly violent outbreak of sun spots.

One thing only can be affirmed with certainty: whatever the cause of the earthquake, its effects were especially violent within the area marked by the

highest lake beaches. Nothing is more striking than the relative immunity of towns built on the hills compared to the ruin which befell those built on the plains. Thus Tagliacozzo, on the slope of a mountain where some observers have located the focus of the shock, suffered practically no damage; while Avezzano, located near by on a part of the plain deserted by the lake before historic times, was almost wiped out of existence. Nearly all the towns which suffered severely likewise rested on lacustrine sands and clays, while hill villages in plain sight stood practically unharmed. The conclusion seems clear that the result of earthquakes are far more disastrous on soft and unconsolidated ground.

THE ITALIAN EARTHQUAKE AREA

THROUGHOUT historic times Italy has been visited again and again by earthquakes of the most destructive kind. These disturbances have occurred now in one part of the country, now in another. Scarcely a single locality is entirely free from them, though some parts have suffered much less than others. Among the areas most frequently shaken are the "toe" of Italy, Calabria, and the entire Apennine range.

The center of the disturbance, round the basin of the former Lake Fucino, together with practically the entire region from which severe damage has been reported, is included within an area, roughly forty miles long by twenty miles wide. A few towns outside this area are mentioned as having been damaged more or less, but evidently no more than should be expected from their proximity to the seat of the disturbance.

The earthquake district lies in the very heart of the Apennine Mountains, fifty miles due east of Rome. For the most part it is exceedingly rough. The mountains rise to elevations of 6000 to 8000 feet, while the valley bottoms lie at about 2100 feet. The slopes are very steep and rocky and, in most places, the valleys are deep and narrow.

A notable exception to this condition is found in the neighborhood of the basin of Lake Fucino, where the topographic features are so abnormal that they arrest the attention at once. A glance at the map will show that the lake lay in the center of a nearly level plain, roughly twelve miles long by eight miles wide, set down as it were, into the midst of one of the most rugged parts of the Apennines.

The rectilinear outlines of this sunken area, cutting as they do across the trend of the mountains, seem to indicate clearly that at some earlier time a block of the mountains has dropped down to form the basin of the lake. Other evidences, too, such as the very presence of so large an undrained depression as the old lake basin, and the occurrence of similar though smaller marshy lowlands to the northwest and west, go to show that comparatively recent movements of the earth's crust have taken place in the vicinity and have interfered seriously with drainage.—From "The Setting of the Recent Italian Earthquake," by John L. Rich, in the *American Review of Reviews* for March.

AN IMPORTANT MOVEMENT IN GEOGRAPHY

By the Editor

LAST July a small group of geographers attended the science section of the National Education Association at St. Paul. The need of a national organization of geography teachers was informally discussed and it was decided to test the sentiment of the country through an open letter in the Journal of Geography and through personal letters to a large number of leaders of geographical thought. Professor George J. Miller of the Mankato, Minnesota, Normal School accepted the task of setting the wheels in motion. The large number of enthusiastic replies which Mr. Miller received to the letter which he sent out seemed to indicate unmistakably that the geographers of the country favored the formation of a national association of geography teachers. The plan received a further and most valuable impetus from the cordial support given it by the Association of American Geographers at their annual meeting in Chicago in December, 1914. Shortly after this meeting Mr. Miller sent out the following letter:

THE NATIONAL COUNCIL OF GEOGRAPHY TEACHERS

"As a result of discussion at the St. Paul meeting of the National Education Association in July, 1914, and of extensive correspondence, the undersigned propose the formation of a National Council of Geography Teachers for the purpose of increasing the interest in geographic education and of promoting better geography-teaching.

It is proposed that representatives from each state form the National Council of Geography Teachers, within which there shall be an executive committee; that the representatives from each state be expected to form a state council, composed of the leaders of geography in their respective states. The chief purpose of the state council shall be to promote better geography-teaching in every way possible, working through existing teachers' associations—state, district, county, etc. It is not expected that the teachers of geography in a single state will necessarily hold separate meetings, but it is intended that they shall meet in connection with existing organizations, and have programs devoted to geography. Other purposes are to get speakers on geography for the programs of all teachers' associations thereby directing attention to it and awakening interest in the subject; to assist school officials in organizing geography in the elementary and high schools in accord with the modern conception of the science; to encourage the preparation of papers on geography-teaching for local and national educational journals. Experience will suggest many other ways of advancing the work.

The inauguration of such a movement was heartily approved by the Association of American Geographers at their meeting in Chicago in December, and an advisory committee was appointed to assist in starting the organization. This committee met with those present who had taken the leading parts in the initial steps and organized as indicated below.

The Chairman of the Committee will appreciate your suggestions on the following points: (1) the possibility of establishing a state council in your state; (2) the persons who should cooperate in this movement in your state; (3) methods of increasing an interest in geography-teaching in your state; (4) methods of financing the small but necessary expense of correspondence; (5) any other pertinent suggestions.

The inaugurating committee discussed various methods of organization and deemed it inadvisable to attempt, at present, the holding of national meetings. It is hoped that at opportune times this will be possible in connection with such organizations as the National Education Association, The Association of American Geographers, and the American Association for the Advancement of Science. It is believed that such an organization as proposed will promote the ends desired in an efficient way.

An early reply will be appreciated.

Geo. J. Miller, State Normal School, Mankato, Minn., Chairman.
L. O. Packard, Normal School, Boston, Mass., Secretary.
Charles C. Colby, Peabody College for Teachers, Nashville, Tenn.
Richard E. Dodge, Teachers College, New York City.
R. H. Whitbeck, University of Wisconsin, Madison, Wis.
Charles R. Dryer, Fort Wayne, Ind.
Inaugurating Committee."

We believe that this movement is fraught with large possibilities. Every school man knows how genuinely school geography needs improvement. Everybody knows that such improvement can come only through the persistent organized effort of many people in many places. The splendid work accomplished by the History Teachers Association is an example of what efficient organized effort can do. History is now one of the major lines of study in every high school; strong courses of study have been worked out, bibliographies have been prepared, a magazine is supported—financially assisted by the American Historical Society—and well-trained teachers are being supplied. The History Teachers Association, like the English Teachers Association and others in their own fields, is both directly and indirectly a powerful factor for the strengthening of history-teaching in the schools. Geography in the high school is not gaining ground at present, partly because it has not the benefit of such an organization. While it would have been better if a national organization of geography teachers had been formed ten years ago, yet, we may feel gratified that it is now making such headway.

A Favorable Time

For a number of reasons the present is a favorable time to initiate the movement for a national organization. The rapid growth of courses in geography in the colleges, particularly in the Middle West, means an increasing supply of qualified teachers. On the popular side, the enormous membership of the National Geographic Society, with its circulation of 400,000 maga-

zines a month, cannot fail to develop a widespread interest in geographical reading. There is no doubt that this is helping school geography by interesting the family in the subject.

On the scientific side, the cooperative work of the American Geographical Society and the Association of American Geographers is full of promise, a promise made all the more encouraging by the addition of Professor Isaiah Bowman to the staff of the American Geographical Society. With three men like Mr. C. C. Adams, Mr. W. L. G. Joerg and Professor Bowman devoting themselves to the American Geographical Society's service, and particularly with the substantial sort of support which is behind them, results of nation-wide significance are inevitable. The generous terms upon which this society invited the co-operation of the Association of American Geographers, and the broad-gauge plans which the society is formulating, give a suggestion of splendid things to follow.

There has been in recent years a notable growth of state and city geographical societies and geographical clubs, Colorado being the latest addition to the group. The geographical lecture courses maintained in Washington by the National Geographic Society are so largely attended that each lecture is given both afternoon and evening, in order to accommodate the people who desire to attend.

These are some of the evidences that the time is favorable for the organization of a National Council of Geography Teachers. It is not desirable to multiply educational gatherings; perhaps they are already too numerous. What seems to be needed is a central National Council, not too large, made up of the leaders of geography in each state. The members of this Council should be men and women who have vision and enthusiasm; men and women who will gather around them the geography teachers of their respective states, and unite them in a whole-hearted, sustained campaign for better school geography. The study may be given a content rich in human worth, but only by a teacher who has gone far enough into the science to see and feel its worth as an instrument of education.

The really effective work of the national organization must be done through state, city, and local organizations. The effectiveness of its efforts will depend upon getting state councilmen who will find in their states persons to take definite responsibility. The real work of uplifting geography-teaching is of two kinds: First, a certain kind of publicity through the educational press,—an awakening of school men to the fact that an old study is taking on new life and must be reckoned with. This will lead to a demand for teachers who are qualified to put new life into an old and somewhat neglected study. This change will come slowly but it will come.

The second phase of the work lies in improving the facilities for training geography teachers. A very substantial improvement in this line is in progress in the colleges and universities. Professor Dodge's investigation* indicates

*Teachers College Record, May, 1914, Vol. XV, No. 2, and Journal of Geography, April, 1915, Vol. XIII, p. 267.

that the normal schools are still doing too little for geography. The pressure upon these schools from all directions is very severe, but geography is entitled to at least a one-year course in every normal school, and eventually it will get it, if the school principals and superintendents call for properly prepared teachers. They will call for such teachers when public educational sentiment suggests it. The new National organization must awaken this sentiment. There are several educational periodicals in each of the more populous states. Their columns are always open to any worthy movement. The National Council should find men to write geographical articles for these periodicals. The state councils should see that geography is adequately represented on the programs of state and county teachers' associations. Five years of such effort will work a big change in geography-teaching in the progressive schools of the country. Mr. Miller is in correspondence with men in 38 of the states. In 13 states, national councilmen have been selected; in several of these, state organizations have been formed or are being formed. Mr. Miller writes (March 25) that Ohio, Kentucky, and part of California and Pennsylvania will organize in April.

The Journal of Geography is glad to place itself at the service of the new organization and to offer its hearty co-operation.

EXCURSION TO ALASKA

PROFESSOR Lawrence Martin is planning to conduct a party for summer field work in Alaska, stopping on the way at the Grand Canyon of the Colorado, the fault lines near San Francisco, and the California exposition. The trip is open to students from other universities and to teachers of geography and geology. It will start the middle of June or first of July for about 2 months. Most of the time will be spent in camp along the fiords and in studying the glaciers of southeastern Alaska, including the Muir, Grand Pacific, Johns Hopkins, and other ice tongues in Glacier Bay near the base of Mt. Fairweather (15,000 feet high), and the Taku, Norris, Eagle, Herbert, Mendenhall, Davidson, Denver, Sawyer, Dawes, Baird, Patterson, LeConte, and the Great Glacier of the Stikine. Examination of faults and other structures in the sedimentary rocks at the border of the coast range batholith, especially in relation to the origin of the fiords. Visits to gold mines, copper mines, marble quarries, gypsum mines, salmon canneries, native villages with totem poles, etc. Possible ascent of Mt. Edgecumbe, a dormant volcano near Sitka. Trip over Canadian Coast Range on White Pass & Yukon Railway. Students without previous training may work for credit in elementary geology and physical geography, while advanced students can take up special problems in physiography, structural geology, stratigraphy, and glacial phenomena. Party limited to 10 men. Total cost probably $500 to $600. For further information address Prof. Lawrence Martin, University of Wisconsin, Madison, Wis.

THE EARTH PRODUCTS OF KANSAS

By W. J. Sutherland
Normal School, Platteville, Wis.

ONE has only to travel over the "Sun Flower" state to become convinced of the importance of her natural resources. Her soils are rich and her fields of corn and alfalfa, her great cattle ranches and her "fields of wheat so full and fair" give evidence of prosperity and plenty. The following sketch, however, will deal with those resources that are hidden from one's eye as he crosses the state on any one of the great railroads that climb the gentle slopes of the Great Plains. It has to do with the coal, the lead and zinc, the oil, the gas, the salt, the gypsum, the building stones, and valuable clays which are not apparent to the eye and yet are of great value and add to the wealth and importance of the state.

Coal

The coal fields of Kansas are in the eastern part and cover about 15,000 square miles. The mines that are now being worked are in the southeastern part of the state, in Labette, Cherokee, Crawford, and Bourbon counties. This region produces two-thirds of all the coal mined in the state at the present time.

The Cherokee shales contain the largest coal beds in Kansas. It is well known that coal is of vegetable origin. During the coal-forming periods vegetation grew in great abundance and attained gigantic proportions. A subsidence of the earth's crust permitted the sea to encroach upon the land; swamp vegetation flourished; giant lepidodendrids and sigillarids fell in tangled masses and were covered by the muds and sands; there they formed beds of peat which later turned into coal. Again the land was lifted, the waters receded, vegetation appeared, and the whole phenomenon of coal formation was repeated. So it often happens that numbers of coal beds are found varying greatly in thickness and in depth.

Oil and Gas

Oil and gas are very important natural resources of Kansas. There are several theories relating to their origin, the one most tenable at present being the organic theory. This theory holds that these substances are products of partial decomposition or destructive distillation of organic matter under water or impervious rocks, and hence away from the oxygen of the air. A familiar example of such a phenomenon is the formation of marsh gas in swamps. Life was abundant in the ancient inland sea, and marine remains formed an ooze on the sea-floor, and this ooze in time hardened into rock. If the resulting rocks were later covered with an impervious stratum, the organic remains would, by the process of distillation, be converted into oil and gas.

It often happens that lateral pressure on the earth's crust causes the strata to warp or bend in gentle folds. This condition of porous strata containing marine remains, capped by an impervious layer, is highly favorable to the accumulation of oil and gas.

Porous limestone or sandstone strata contain water, oil, and gas. Water, being heavier than oil, will collect in the downward folds or synclines. The gas will rise to the highest level and occupy the upward folds or anticlines. Between the water and gas, in the strata that dip away from the axis of the anticline, will be found the oil.

The Midcontinental oil and gas field is one of the most productive in the United States. This field lies in Kansas and Oklahoma. At the height of production in 1905 Kansas produced 12,000,000 barrels of crude oil, besides furnishing natural gas by means of pipe lines to 125 cities and towns, including Kansas City, Atchison, Leavenworth, Lawrence, and Topeka. Practically all of this oil and gas comes from the Lower Carboniferous strata of Allen, Wilson, Neosho, Montgomery, and Chautauqua counties.

Lead and Zinc

The lead and zinc deposits of Kansas are in the extreme southeastern part of the state. They are deposits in the Mississippian strata of the Ozark region. Galena, Kansas, takes its name from lead-sulphide (PbS), as does Galena, Illinois. The Galena region has been one of the rich producers of the Joplin-Galena district. For the past fifteen years the value of its combined output of lead and zinc has varied annually from $1,000,000 to $5,000,000.

The origin and mode of occurrence of these minerals are interesting studies. There is little doubt that they were produced from water-solution. "If there was a small amount of lead and zinc in formations which at one time rested upon the present rocks containing ore, and if these formations were removed by ordinary process of erosion, then the little particles of the sulphide of lead, iron, copper, etc., would become oxidized and rendered soluble and would be carried downward by movements of surface waters, only to be precipitated again in a more concentrated form in the lower-lying crevices and openings."

Gypsum and Salt

Another valuable mineral resource of Kansas is gypsum, commercially important as fertilizer, and as the raw material from which plaster of Paris—cement plaster—is made.

The oldest rock formations of Kansas are of economic importance because they all bear minerals which add much to the value of the natural resources of the state.

1. The Mississippian formations bear deposits of lead and zinc.
2. The Carboniferous formations bear deposits of coal, oil, and gas.
3. The Permian formations bear deposits of gypsum, salt, and clay.

Gypsum is formed by the concentration of ocean water. Time was when a part of the coast of our continent was coincident with the eastern boundary of Kansas. Ripple marks found in the shales and coals give evidence of shallow coastal waters. At the close of the Carboniferous times a long arm of the Gulf of Mexico extended far north into the great plateau region, its eastern shore being approximately the east boundary of Kansas. A steady but slow

uplift of the ocean floor caused the shore-line to migrate westward, driving the ocean waters before it. Simultaneously with this uplift, thick deposits of Permian formation were distributed over the state.

As the water thus receded the westward pockets and basins of the old sea-floor were left filled with ocean water. As these lakes and ponds in time evaporated, the process of concentration occurred and, as a result, beds of gypsum were deposited. This is the rock gypsum. Earth gypsum, found in Dickinson, Salina, Marion, Butler, and Sedgwick counties, is well mixed with silt, clay, etc., and is supposed to be a re-deposition from streams or springs whose waters had been in contact with the soluble gypsum rock.

Gypsum rock is largely distributed in Comanche, Barton, Kiowa, Salina, Dickinson, and Marshall counties. It is also found in Marion, Harvey, Sedgwick, and Sumner counties.

Cement plaster is manufactured at Blue Rapids, Dillon, Rhodes, Longford, and Medicine Lodge. The chief step in its manufacture is the process of heating the gypsum rock to drive out the water.

Salt, like gypsum, is a deposition of saline waters. In the production of salt, Kansas is the fourth state, being surpassed only by New York, Michigan, and Ohio. In 1910 Kansas produced 2,800,000 barrels of salt. Hutchinson, Lyons, Kanopolis, and Kingman are engaged in salt manufacture.

Building Stone and Clay

Limestone and sandstone are of commercial importance as building material. Kansas is generously supplied with rock deposits of excellent quality. The commercial value of rock depends, among other qualities, upon—

1. The ease with which it can be quarried.
2. Its color and texture.
3. Its durability.

Building stone of excellent quality is found in many parts of the state. Geary, Riley, Cowley, and Chase counties have fine quarries.

Valuable clays are found in many parts of the state. There are different varieties and the supplies are practically inexhaustible.

Pure clay is a compound of aluminum, silicon, and oxygen combined chemically with water. Such clay is called kaolin. The term "clay" as commonly used applies to any soft earthy substance capable of assuming any desired form and retaining that form during the process of burning. Fire clays are found underneath coal beds. Their position is explained by the fact that the vegetable growth that was converted into coal extracted certain elements from the soil in which it grew, thereby leaving a stratum of under-clay of such physical and chemical properties as to withstand, without melting, the high degrees of heat necessary to burn it.

The clay output is in the form of tile and vitrified brick. Large quantities of these products are shipped from Cherryvale and Coffeyville.

While we are more likely to think of corn, wheat and live stock in connection with the great state of Kansas, it must be apparent from the above statements that the earth products are also of great importance.

DEATH VALLEY

By George D. Hubbard
Oberlin College, Oberlin, Ohio

DEATH Valley is selected as a type of a structural feature common in the Great Basin in Western United States. It was not made by a stream and perhaps ought not to be called a valley at all. Neither is it in general a death-dealing place, but received its name because of the fatally disastrous results which its lack of drinking water visited upon a lost gold-mining party hastening to the Sierra gulches in 1849. Death Valley has often been said to contain carbonic acid gas and by this means to suffocate its visitors, but the ravine which fills with carbon dioxide is Death Gulch in Yellowstone Park and not this much larger valley in California.

Like a hundred other depressions in the Great Basin, Death Valley owes its origin to two processes: (a) the faulting and displacement of blocks of stratified and igneous rocks, and (b) more or less erosion on the resulting forms. Approximately parallel faults, or cracks with displacement, extend through the basin region from southern California completely into Oregon. Along some of these cracks the vertical movement has been very great. Some blocks of rock have been shoved up, others have been dropped down; some have been tilted and some have been more or less crushed. Thus the characteristic forms of the Great Basin are long, rugged, rocky, serrate ridges or mountain ranges with a steep slope on one side and a gentler one on the other, rising above, and more or less completely shutting in, elongate often curved and crooked, deeply aggraded depressions. Many of these have no exterior drainage. Some would contain lakes and would overflow if the rainfall were slightly increased. Some contain temporary or intermittent lakes which may be either fresh or salt, and when salt, either with common salt or carbonates or borax or with several salts mingled.

Location

Death Valley lies in the eastern part of Inyo County, south western California, bounded on the west side by the Panamint mountain range and beyond the mountain Panamint Valley, and bounded on the east side by the Amargosa range, divided by east and west cols into short sections which are named from north to south Grape Vine, Funeral, and Black Mountains, three short ridges which make up the larger range. The state boundary between Nevada and California lies along the eastern part of this range. Death Valley is from five to twelve miles wide and one hundred and twenty-five miles in length, markedly constricted about one third of the way from the north end. It has no outlet to the sea. This valley happens to be the result of the dropping down of one block with reference to its neighbors, so that the floor of the valley, in spite of the extensive subsequent filling, now lies farther below sea level than any other portion of the United States not covered by water. More than five hun-

dred square miles of the floor lie below sea level and the lowest point is at least two hundred and eighty feet beneath that level.

Description

Following these general lines given in the previous paragraph, many details ornament the valley. In many places because of the broken strata in the walls of the valley spring waters issue, and run down the slope toward the bottom to be soaked up by the sands at the foot. Some of these springs are of fresh, cool, thirst-slaking water; others are salty, with common table salt and borax, and others have even less agreeable substances. Some of the springs are very warm and are said to be boiling. Occasionally a spring has been found to be very injurious to man and has been marked as a "poison" spring. In a number of places, wells have been dug. Not many of these furnish water suitable for drinking, but they may be of value as sources of salt.

The walls of the valley are ribbed by erosion valleys and divide crests, both of which rise rapidly to the tops of the bounding mountains. Down these ravines, when rain falls, the water rushes with great velocity, sweeping stones and gravel and sand out upon the valley floor. Consequently the floor is very well covered with sand and stones, but because the valley has no outlet and the water which runs into it usually contains salt which is left behind upon evaporation of the water, the sand is thoroughly mixed with quantities of salt. A considerable stream leads into the valley at the south end from Amargosa Valley which lies to the east. This water is brackish when it enters, and during rainy weather accumulates on the floor of the valley to a depth sometimes of many feet, forming a temporary lake of thousands of acres. These waters dissolve the salt already on the floor of the valley, mingle them with the salts brought in, and when the water again evaporates, which must necessarily take place in so dry a climate, the salts are again left on the valley floor. Several tracts are covered with a snow-white, glistening mantle of salt, producing extremely smooth salt flats. In other places the salt is less disturbed by the waters and has become broken up by re-crystallization until the salt surface is rough to travel over. Of course, these salt areas occupy the lower portions of the valley and just beyond them, along the valley sides are the mud flats, where the edges of the waters lie when the valley becomes flooded.

In rainy weather these mud flats become muddy and sticky, but in dry weather both sand and mud and salt are blown about more or less by the winds. It is believed that a much larger stream than the Amargosa formerly entered this valley, from the Mohave desert, leaving its waters in the depression to evaporate. Consequently, there may have been a very considerable lake at former stages in the history of Death Valley, but any record of such a lake, either in shore lines or in beds of salt, is completely covered by the later, less organized deposits. Many craggy cliffs overlook the valley from the divides between the little laterals that lead down into Death Valley. These are more or less wind-carved, and grooved, and bear fantastic names appropriate to their forms.

Climate and Vegetation

Shut in by mountains and lying in the lee of the great Sierras which rise 10,000 feet above sea level across the approaching Westerlies, Death Valley can receive but little rain from the west, even in winter when conditions are most favorable. In summer the valley lies in the high pressure belt of calms and in the beginnings of the Trades whose only course has been across as arid lands as the valley itself, hence very little rain can come in summer time. The total rain fall in the valley rarely exceeds five inches in a year and averages less than half that amount. Over the surrounding slopes the precipitation is a little greater, but is nowhere sufficient to promote the growth of much vegetation. Mesquite grows over small areas or in clumps here and there. Grass is very rare. Upon the bordering slopes there is a larger variety of tree growth and some shrubs and scanty grass but much of it dries down during the heat of summer.

The depth of the valley and lack of water for evaporation and consequent cooling give the depression in this latitude a high summer temperature. With the dryness and heat and the winds that often blow strongly here, the sand, dust, and salt greatly harass the traveller.

Culture

One would think that such a place as Death Valley would be rather devoid of culture, but it has been visited considerably by man, and to its peculiar geographic complexities many adjustments have been made. Adjustment is often more necessary in such places than in more favored localities. Wagon roads run the entire length of the valley with stops at some of the springs and wells, where water can be had. An automobile road runs through the Amargosa Valley and sends a branch through a low pass into Death Valley. Branch roads lead off from the main road through the valley, up many of the ravines and gulches to springs and in a few cases to mineral deposits. The wells will probably some day be pumped and the water from them evaporated to recover the potash which is universally associated with the salt in the valley. This potash is an essential plant food and will be used in the manufacture of fertilizers.

At two points in the valley borax works have been constructed and some of this salt is being recovered for commercial purposes. Probably, however, the common salt is by far the most valuable of the mineral resources of the valley; but in as much as there are many other places where salt can be recovered without encountering so great physical hardships, as must be overcome here, the salt of Death Valley may not be extensively used.

The valley can be visited easily at almost any time of year by travelers on the Santa Fe or Union Pacific Railroad by taking the Tonopah and Tide Water Railroad which connects these two main lines and passes through the Amargosa Valley some fifteen miles east of Death Valley. Of course, no such valley as this can ever be of any particular value for agriculture, grazing, forestry, or in fact for permanent settlements of any kind unless there should

come a great climatic change. The region is so low and is nestled down between such elevated mountain chains that it is very warm and also very dry, but it is slowly being filled up by the wash from the sides; and the time can not be far away, physiographically speaking, when Death Valley shall not be below sea level, but perhaps many feet above. As this grading-up process advances, the extreme heat will be reduced and a valley trench leading out may be established, so that the saltiness can be reduced and then possibly some agricultural use can be made of the place.

Its chief interest today centers in the fact that its floor lies farther below sea level than any other ground in America. But aside from this fact, Death Valley can be duplicated by scores of valleys, perhaps equally large and equally interesting, throughout the Great Basin.

FRANCE: ITS NATIONAL DEFENSE*

By Onesime Reclus

Translated by Dr. A. N. Winchell, University of Wisconsin

THE situation of Europe requires that France should be strong, neither attacking nor provoking any country. She has no one to fear. In order to carry out this program, she counts on the valor of her army and navy and on the strength of her frontiers. Secondarily, she counts on her allies and her friendships.

In spite of the variations in sentiment and interests which sometimes unite the powers and sometimes arm them against one another, the national defense need not consider all the possibilities of conflict nor be prepared for defections. At the present time France is supported by the Russian Alliance and the English friendship, and directs her efforts against the strongest and most dangerous power of the Germanic-Italic-Austrian Alliance—the German Empire. Assuming the conflict between the forces of the Triple Alliance and those of the Triple Entente, we should have to contend with not only the German active army of 876,000 men, but the 300,000 men of the active Italian army, and the 400,000 men of the active Austrian army. On our side we could count upon the 1,470,000 of the active army of Russia, but upon those only, because it is not probable that England, if it was brought into the conflict, would consent to divert its army of 425,000 men against Holstein or Hanover or even Flanders (in case Germany should violate the neutrality of Belgium) and create there a diversion. With its fleet it may be able to do more or less; its superiority, still undisputed, over anyone of the European fleets would assure us freedom on the seas.

After 1870, French strategy had at first no other objective than the protection of its territory against a new invasion of Germans, and to accomplish this used only the one method of the construction of lines of forts between

*From an article by Onesime Reclus published in the "*Atlas de la Plus Grande France*," a short time before the present European War.

the northeastern frontier and the French capital, blocking the road to Paris. The adhesion of Italy to the Triple Alliance, the monopoly of Luxemburg by Germany, and the fear of the violation of the neutrality of Belgium and of Switzerland, have forced us to fortify our frontiers from Dunkirk all the way to the Mediterranean Sea. In the meantime military strategy has undergone some evolution. It has conserved the lines of fortification, but, counting more on the movements of the army, it has directed its efforts toward the construction of entrenched camps suitable to furnish strong bases of operations. At the same time it has multiplied railroad lines with vast terminals destined to concentrate rapidly large bodies of troops at points to be protected or attacked. From this conception an army organization results which may be described in general as follows:

The French System of Defenses

In the fortified towns near the frontiers permanent garrisons are established destined to receive or to give the first blows of the war. On the frontier itself fortifications guard the principal railroads. Back of this region, on what one may call the military frontier, entrenched camps are connected by lines of fortifications and separated by intervals where the natural topography limits the field of action of the enemy. Here and there are several series of new entrenched camps. Still farther from the frontier are the great central points of our national defense, Paris and Lyons. Four army corps form the garrison of the northeastern frontier. They are on war footing and can enter upon a campaign a few hours after a declaration of war.

The natural configuration of France apparently determines four possible zones of military operations. 1. Lorraine, Champagne, Burgundy and Breese. 2. Artois, Flanders and Piccardy. 3. The valley of the Rhone and Provence. 4. Guyenne and Gascoygne. Here again the present conditions of foreign politics intervenes. They permit us, in view of our relations with Spain and also in view of the formidable barrier of the Pyrenees Mountains, to neglect this fourth zone and to concentrate our attention on the three others, which are in more or less direct contact with Germany and Italy. The first and the third, those of the northeast and of the southeast, are protected in whole or in part by mountains, rivers, hills and forests, and have received from military engineers additional fortifications at strategic points. The second, to the north, is destitute of natural fortification and must be fortified artificially.

On the northeast frontier, which is protected by the Jura Mountains, the Vosges Mountains, the Meuse River and its tributaries, the Meurthe and the Moselle, and secondarily by the Saone and the Marne, military genius has completed the works of nature by fortifying the exposed points. The Alpine frontier, naturally more easy to defend in spite of the relatively easy crossing of its passes, is fortified at numerous points, and secondarily by the great entrenched camps of Lyons and Toulon. The northern frontier is left open to the enemy by nature. The neutrality of Belgium, which covers it from a point northwest of German Lorraine to the north sea, should be sufficient to

protect it; but, in fact, no one believes that neutrality is a sufficient protection, not even the Belgians, who have multiplied on the Meuse defensive works and have strongly fortified Liege, Namur and Antwerp. All of the forts made by Belgium to repel invasion are so much added to the defense of France. Assuming an invasion which, crossing Belgium would try to penetrate our country, our armies would find it necessary to engage in battle immediately. They would be supported by the fortified points of Dunkirk, Lille, Maubeuge, Charlemont, and secondarily by Fere, Laon and Rheims.

If all the lines of defense of the frontier were broken, Morvan and the central plateau would see the final supreme efforts of national resistance.

If we consider the extreme difficulty of invading France through the Alps or the Jura Mountains, the considerable difficulty of army operations in the Vosges Mountains or in the Ardenne covered by forests and swamps, and if we consider on the other hand the natural battle fields formed by Lorraine and the Palatinate, the fields of the Moselle, the Meuse and the Sarre, or the vast plain of Flanders, we must conclude that the probable theatre of future hostilities is in these latter regions. Here also a neutrality intervenes—that of Luxemburg. But through its railroads the country is already in German control, and military strategists count so little upon the neutrality of Luxemburg that they accord to the adjacent plains of the Woevre the sad and glorious privilege of supporting the first shock of the war.

The Defense of the Northeast Frontier

The French frontier between Longwy and Belfort is divided into three parts which are distinguished by the nature of the country and the strength of the fortifications. The first part between Longwy and Nancy includes the plains of Woevre. The second, extending to Donon, faces the gap of Charmes. The third extends along the Vosges Mountains from Donon to Ballon.

The Woevre, a large plain whose valleys and roads give access to the Meuse and the important railroad which follows its course, is open to invasion. * * * We may readily suppose that the invading army will attack by preference on the plains of Woevre. Furthermore the formidable way in which the German troops are massed on the front near Metz ready for the attack on the plains of Woevre is the principal but not the only point of danger along the northeast frontier. Before 1870, and even after that date, Moltke made of it the invariable plan of a war against France. The former Marshall, military writers, and officers discussed the plan, noted its inadequacy and supported it by a complimentary movement, a flanking movement through the gap of Stenay and a simultaneous more widely flanking movement through Belgium. They showed the advantage of attacking the French forces in front and on the flank at the same time, and also the difficulty of attacking our forces on a front too narrow to enable the Germans to profit by their numerical superiority.

The neutrality of Belgium is of little weight, but will the Germans expose themselves by violating it to a new enemy whose forces are not to be dis-

dained? Will they have recourse to a flanking movement by the gap of Stenay together with the direct attack, or taking lessons from the last wars and recognizing the necessity of renewing an attack with fresh troops and having recourse to troops arranged deeply on Enechelon, will they revert to the plan of Moltke and adopt only the direct attack? That is the secret of tomorrow.

. . . . . .

Reclus goes on to describe the disposition of the various parts of the German army on the three assumptions of (1) A direct attack on the plains of Woevre. (2) A direct attack together with a flanking movement through the gap of Stenay. (3) A direct attack together with an attack through the gap of Stenay and a wide flanking movement through Belgium. Finally he argues that both preparations in Switzerland and railroad construction in Germany make a flanking attack through Switzerland very improbable.

Translator's Note: It is an interesting fact that the Germans in the present war have respected the neutrality of Switzerland, and have violated the neutrality of Belgium, as predicted by Reclus. They have adopted the third one of the modes of attack described by him, because it was the plan which enabled them to make full use of their numerical superiority in men. As suggested by Reclus this violation of Belgian neutrality has resulted also in bringing England into the war, not only with her powerful navy, but also, contrary to his prediction, with a formidable army.

THE PRESENT STATUS OF HIGH SCHOOL PHYSICAL GEOGRAPHY

IN the April *School Science and Mathematics*, Mr. Charles E. Peet of Lewis Institute, Chicago, publishes the first installment of the report of his committee's investigation of Physical Geography. He says:

"The impression has been abroad for some time that high school physiography is on the decline, that it has failed to make good and is either being displaced by other subjects or the course is being shortened to make place for other subjects. Your committee was appointed to ascertain the facts. The first effort of the committee was to learn how many schools have dropped the physiography in the last few years. Correspondence with the State Superintendents of Public Instruction of Iowa, Minnesota, Wisconsin, Michigan, Illinois and Indiana, brought out the fact, that with one exception, there are no statistics in their possession bearing on this point. From the Minnesota superintendent we learn that the number of high schools in that state offering physiography have been practically constant in the last four years. Without taking a census of the high schools by mail, we have seen no way of getting the complete facts. In Iowa, Miss Alison E. Aitchison, a member of this committee, examined the entrance credentials filed by 473 students, representing more than 250 Iowa high schools and found that only 32 did not present physiography as an entrance credit. It is the opinion of one of the geologists of

the University of Iowa that physiography is being replaced by general science, and by agriculture and biology, but that the change is so recent that it does not yet show in the entrance credentials.

As another possible source of information letters were addressed to the principals of 161 high schools, in the states mentioned, which have recently adopted "Clark's General Science" as a textbook.

The committee received replies from forty-eight schools. Thirty-four of these schools offer a course in physical geography, and five in general geography. In nine schools physical geography has been dropped. In its place seven have substituted elementary science; one manual training for boys and physiology for girls; and another elementary science and general geography. In five of the thirty-four schools now giving physical geography the course has been cut to a half year, and elementary science introduced; in four schools physical geography has been moved to a later year by the introduction of elementary science."

One point in the enquiry had to do with the extent to which General Science is displacing Physical Geography and the reasons. Mr. Peet prints a list of six reasons given by different persons, and concludes with the statement: "The facts gathered do not show the marked falling off in the physiography that would be expected considering that the information comes from schools which have recently introduced a subject that is supposed to be displacing it."

Another line of enquiry aimed to discover to how great an extent the impression that "physiography has not made good" is true. The replies from colleges and normal schools indicate that they are not able to build their courses upon the knowledge of physiography supposed to have been gained in the high school. One college professor's reply seems to state the situation well: "The foundation (in physiography) is as good probably as the foundation in any other subject pursued in the high school for the same length of time. For example, half a year of algebra in the first year of high school is not a very sure foundation for mathematics."

To the question: "In your judgment how do the results in physiography compare with those in botany, zoology, physics, and chemistry?" seventeen answer that in physiography they are inferior. Four more say that they are inferior to the results in physics and chemistry, but equal to those in botany and zoology; one says that the results are inferior to those in botany with girls and in physics with boys. Eight answer that the results in physiography are equal to, and four that they are superior to those in the other subjects mentioned. Eight answer that they do not know, or that comparison is impossible. Other answers are: "The results are less definite but no less in value." "The value is greater on account of the greater value of the subject, but ordinary examinations would suggest a contrary conclusion, for physiography is not as well taught as are the other subjects." "The results are as permanent as those in the other subjects."

In reply to the question, "What tangible results do you observe have been

produced by the high school physiography?" eleven answer that no tangible results have been observed. Other answers are as follows:

1. "Most of the high schools in this state give a course in the first year which is intended to be an introduction to scientific methods of observation and reasoning. As the students have no foundation to build on, they do not really gain much, and so do not apply the little they do gain, and it does not stay with them. The course is usually taught by whichever instructor happens to have the least regular work on his schedule, without any regard to his fitness or preparation. Hence the net results are usually small; quite as often as not, they are actually negative. Frequently the student is given a distaste for science in general. A well selected course in general science taught by a specially trained instructor would give much better results.

"There are a few schools where the subject is well taught and good results are secured, but when the pupils are twelve to fourteen years old, as they usually are in the first year of the high school, the instruction given can hardly be called instruction in physiography. A few schools do really good work with their seniors in courses which emphasize and correlate the principles learned in the other science courses and so help to fix them."

2. "On the whole the results have been beneficial, but not commensurate with the time spent because of the teacher's general lack of preparation in geology."

3. "Where the teacher has been a good one, a great deal has been done to make the pupil think about processes going on around him. With a good teacher much interest has been developed and the work is excellent."

4. "High school physiography in so far as it is handled by specially trained teachers has been markedly successful and has supplied new and useful ideas in great numbers and more than any other subject. But the result is not apparent in cases where the music teacher or the teacher of English Literature or any other unqualified person is assigned the work in physiography. The day has passed when 'any old person' can handle physiography."

5. "I have spent considerable time in investigating this problem in Iowa, and I think I can say that a considerable interest in the subject has been developed, and one that is educational. This, I find, varies with the conditions under which it is taught."

6. "As a rule an interest is developed. In individual cases I have found the opposite."

7. "I rarely find a student enthusiastic about the subject; as a rule students are indifferent to it."

8. When high school physiography is well taught we get good results. Well taught students want to go on with the subject. They find it helpful in history, economics, and geology."

9. "General appreciation of earth sciences."

10. "Renders the student better able to cope with general geology and stimulates an interest in natural science."

11. "In the few instances under my observation, a firmer grasp of geographical problems is the result."

12. "Makes better teachers in geography."

13. "The mind has been opened to view large things and to view small things in a large way."

14. "In a few high schools where the teachers have had special preparation for their work, I find that the pupils have acquired a well organized body of facts."

15. "The results stand second to none as a first year high school subject. Give it a full year with an enthusiastic teacher and you put the boys and girls in touch with more valuable notions about the common things of life in broad outlines than is possible in any other subject. Pupils like it. They have their eyes opened to a helpful interpretation of the common things about them. They enjoy their walks, excursions, and travels better. They see and appreciate relationship among wind belts, rainfall, vegetation, and population and industry."

16. "Doubtless there are results, but these are not tangible except in an occasional student. I sometimes think the poor work of students (some of them) having previous preparation may be in part due to an attempt to slide through on what they have retained of the past work, coupled with a spirit of rebellion at having to do this work over again (though they can make little progress unless they do)."

17. "Occasionally a man enters my classes, whose interest has been aroused by his course in physiography, but it usually takes the form of a belief that he has learned all that is to be obtained."

18. "Usually the only tangible thing in evidence is a superficiality and conceit of knowledge. The exceptions are individual."

19. "I am not prepared to speak positively, but it is my opinion that because of the usually poor preparation of high school teachers for teaching physiography, it does more harm than good."

COMMERCIAL RUSSIA

(From Special Consular Report No. 61)

Transportation

RUSSIA'S vast territorial extent and the bulky character of the products entering into its commerce, both foreign and domestic, have made the question of transportation vital. The marshy character of a large part of European Russia, with the lack of available road materials and the sparsely settled condition of much of the country, have made the construction of good roads difficult, and there are something less than 500,000 miles of roadways in the entire Empire. Of the existing roads, more than 300,000 miles are in European Russia proper, and more than 45,000 miles in Russian Poland. During the winter sledges are used throughout the greater part of the coun-

try, and transportation is then easier than over the roads during the open season.

Inland Waterways

Its water transportation facilities have played an important part in the economic development of the country, and although the expenditure on river and canal improvements in Russia between 1860 and 1910 amounted to only about $40,000,000, as compared with more than $3,000,000,000 expended on railways, the growth of the water-borne traffic has been nearly as great as that of the railway traffic. About one-third of the Empire's total freight is transported by water, and this proportion has shown little variation during the last 30 years. The chief articles of freight shipped by the water routes are timber (which makes up 52 per cent of the water-borne freight), grain, naphtha and its products, salt, and coal.

The European part of the Empire is well provided with rivers of considerable size, affording shipping routes from the interior of the country to the Caspian, Black, Baltic, White, and North Seas, while in Siberia several great rivers rise near the southern boundary and empty into the Arctic Ocean, and the Amur system spreads itself across the southeastern part and flows into the Sea of Okhotsk at Nikolaiefsk.

The total length of the rivers, lakes, and canals of the Russian Empire is 239,161 miles, of which about 178,580 miles are navigable; 66 per cent of the total navigable length is suitable only for rafts and about 32 per cent for steamers. In northern Russia navigation is open from May to October; in central Russia, from April to November; in southern Russia, from March to November. In Siberia, the rivers are navigable in their southern courses from May to October, in their middle courses from May to September, and in all northern parts from June to August.

The Volga River System

The basin of the Volga River contains the greatest network of waterways in the Empire, the 19,060 miles of navigable streams in that system being nearly 40 per cent of the country's total. The lack of an outlet from the Caspian Sea, into which the Volga empties, however, necessitates the transferral of a large part of the freight sent down this river to the railway at Tsaritsin, and then to vessels on the River Don, which empties into the Sea of Azof, an arm of the Black Sea. The two rivers are less than 50 miles apart at Tsaritsin and projects to connect them by a canal date back to at least the sixteenth century. The work has never been actually undertaken, however.

In the spring of 1912 a company applied for a concession to connect the two rivers, its project calling for the construction of a canal at a cost of $43,000,000 and the dredging of the Don to make it navigable for ships of the Volga type, at a cost of about $10,000,000. The completion of such a canal would permit the bulk of the grain from the Volga basin to go out by way of the Black Sea, with an all-water route instead of being shipped by way of the Baltic, as at present. Timber could be transported from the Kama

district, sugar from the southwest, and naphtha from the Caspian and Volga regions. Cotton from Transcaucasia and great supplies of grain and other products from Siberia could be shipped by way of the canal.

Other Great Rivers

The Don River system has 2,508 miles of navigable waterway, while the Dnieper, Dniester, and Southern Bug Rivers, which enter the Black Sea at Kherson, Odessa, and Nicolaief, respectively, have with their branches navigable lengths of 6,300 miles, 534 miles, and 90 miles, respectively. The Vistula River system flows through Poland and then through northern Germany to the Baltic, with a navigable length of 2,016 miles.

In Siberia the Ob River system stretches from south of the Chinese boundary to the Gulf of Ob, on the Arctic Ocean, with a total navigable length of 16,869 miles. To the east of the Ob the Yenisei River system also crosses the country from south to north, being navigable for 11,808 miles, including Lake Baikal. The Lena River also gives a large part of Siberia water connection with the Arctic Ocean, being navigable for 6,864 miles, while smaller rivers pouring into the same ocean have a combined length of navigable channels of 5,443 miles.

The Amur River, which serves for a large part of its course as the boundary between Siberia and Manchuria, is the only large system flowing through Siberia to the east. It is navigable for 8,541 miles and taps the section crossed by the eastern part of the Trans-Siberian Railway.

Russia's Canal System

The canal system of Russia was largely constructed during the first half of the nineteenth century, and has been developed in eight connecting links. By these canals and canalized rivers the Caspian, Baltic, and White Seas and the Baltic and Black Seas are connected. The Volga is joined to the Neva by three canals, giving through water connection from St. Petersburg to the Caspian Sea, and with the northern Dvina by the Duke Alexander of Wurttemberg Canal, which unites the White and Caspian Seas. The Dnieper is connected by canals with the western Dvina, the Niemen, and the Vistula (via the Bug) Rivers, emptying into the Baltic, which connect that sea by water with the Black Sea. Finally, the Vistula is linked with the Niemen River by the Augusta Canal, 61 miles in length. The Ob-Yenisei waterway in Siberia runs from Irbit, on the Nitsa River, close to the frontier of European Russia, to Kiakhta, on the Selungua River, on the Chinese frontier, a distance of nearly 3,650 miles. The total length of artificial waterways is 1,225 miles. Of these artificial waterways 505 miles represent canals and 556 miles natural watercourses made navigable by sluices, etc.

It may be safely assumed that the river fleet numbers more than 4,000 steamers and not less than 23,500 barges, etc.

In regard to Asiatic Russia, the river fleet on the Ob, Yenisei, Lena, and Amur consisted in 1906 of 414 steamers and 825 other boats, with a total

capacity of 419,354 tons. Navigation is greater on the Ob (136 steamers and other vessels) and Amur (116 steamers and 247 other craft).

Railway Systems

The growth of Russia's railway system dates practically from the decade 1867-1877, at the close of which the mileage in the Empire amounted to 13,023. On the first of January, 1912, the total opened to permanent traffic was 46,221 miles, of which 28,744 belonged to the Russian Government lines, 14,079 to private lines, in Russia, 2,140 to the Finnish Government lines, 179 to private lines in Finland, and 1,079 to the Chinese Eastern Railway. In actual mileage, Russia ranks next to the United States, but its mileage in proportion to its population and area is small. The needs of the more densely settled southern and western parts of European Russia have been so great that only a few trunk lines have been extended into the newer sections, to aid in their exploitation, and these lines have so few branches or "feeders" that a large part of the Empire is left without railway facilities. Most of the important lines are in the hands of the Government, which has a definite program for the extension of existing lines and the construction of new ones to satisfy the demands of the many regions now in great need of railways, and to prevent the useless construction of lines in regions where they are not required.

Fairs

Fairs occupy a prominent position in the distributive mechanism of Russia, although they are gradually losing their importance with the extension of modern means of communication, which brings producer and consumer directly into touch with one another. Formerly the annual or seasonal fairs held at the most readily accessible places under the old form of transportation afforded the only markets where the people could dispose of their products, either by barter or sale, and obtain such articles as they needed and could not themselves produce. Commerce was in the hands of general traders, and most of the fairs served only a limited region. Some of the great fairs, however, drew traders from all parts of the country and became famous as the commercial centers of the country.

The Central Statistical Committee gives the number of fairs held in Russia at present as 16,000, with an annual turnover of more than $500,000,000. Most of these fairs (87 per cent) are agricultural, and only some 10 per cent have a turnover, retail and wholesale, of $5,000 to $50,000 per annum. The great fairs, with annual turnovers of $50,000 to $500,000, form only 1 per cent of the total number, and only two of these fairs have retained their national importance. These are the annual fairs at Nizhni Novgorod and Irbit.

The Great Fair at Nizhni Novgorod

Nizhni Novgorod owes its prominence to its position on the Volga River, which, with its tributaries, affords water communication with practically all

the great producing centers of European Russia and also served in former times as part of the principal trade route to Asia. Its trade is principally in the bulky products, such as furs, cotton goods, raw hides, tanned skins, leather goods, sheepskins, glass, and glassware. Most of the large cotton manufacturers of Lodz, Poland, maintain their own stores at Nizhni Novgorod. In the international market this fair is still important, sending out large quantities of furs, and rawhides (chiefly to the United States), wool, old rubber, cloth, etc.

There is also considerable sale of manufactured goods at the Nizhni Novgorod fair. Plated goods, enameled ironware, bent-wood furniture, and boots and shoes are largely sold by Polish manufacturers, although the European Russian makers of boots and shoes are now offering strong competition in that line. Buyers come from Persia, Khiva, Afghanistan, and the Caucasus to purchase manufactures of various sorts.

The Nizhni Novgorod fair opens in July and closes about the middle of September each year. Its character is largely dependent on the harvest, and in 1912 the trading was considered as very good. There is no noticeable decline in the actual amount of business done, but the fair is gradually losing its importance, and its effect on trade is diminishing. With the growing tendency to deal by means of samples, instead of presenting the entire stock to the customer's attention, and with the increasing facility with which manufacturers are able to reach their markets direct, the need for the fair is disappearing.

The Fur Fair At Irbit

Irbit is near the rich northern and central Ural regions, in the heart of the fur district, and is still an important exchange center in trade between European and Asiatic Russia. About 58 per cent of its business is with European Russia and the Caucasus, 40 per cent with Siberia, and only about 2 per cent with foreign countries. Its annual turnover amounts now to some $15,000,000, while formerly it ran as high as $36,000,000. Its trade in iron, cotton, wool, tea, sugar, and similar products has practically disappeared, and the trade in manufactured goods is also on the wane, as Russian firms are opening permanent stores in Siberia. In the fur, skin, and hide trade, Irbit still occupies a leading position, and its trade in glass, glassware, ropes, cordage, and similar bulky products is still large. All the chief Russian fur companies are directly represented at the Irbit fair, as are many foreign concerns, and furs from this fair make up from 30 to 50 per cent of the fur sales on the great markets of Leipzig and London. Left-over stocks of furs from the Irbit fair are sent to Nizhni Novgorod. Considerable business is also done in metal, wood, woolen, and homemade leather goods. The Irbit fair lasts through the month of February.

Minor Fairs

The annual fair held at Kief in February and March was formerly important, not for the sale of goods (its annual turnover is only some $2,500,-

000), but for the contracts that were made there. This fair bore some resemblance to foreign produce exchanges, and its business was principally done in sugar, spirits, wheat, seeds, agricultural produce, etc., and in the purchase, sale, and leasing of land. Bankers, manufacturers, agriculturalists, and others met at Kief during the fair to settle their outstanding accounts, and make contracts for future fulfillment. It was also customary for the stockholders of most of the sugar factories within a wide radius to assemble at Kief for their annual meetings. This fair has now lost most of its importance, however.

The enormous timber trade of Russia is still largely conducted through special fairs, of which the most important are those held at Kozmodemiansk, Kazan Government, from June to August, and at Tomel, Mohilev Government, in January. The average turnover of each of these fairs is $1,500,000 to $1,800,000.

Some 5,000 horse fairs are held throughout Russia each year, the largest being at Simbirsk, with a turnover of about $75,000, and cattle fairs are held in the steppe Provinces of Voronezh, Kharkof, and the Don. From 3,000 to 15,000 head of cattle are annually sold to salters at these fairs.

Forests

Russia now occupies first place among the nations of the world in the extent of its timber resources, the value and quality of two-thirds of which are practically unknown. The total area of the Empire is about one-seventh of the land surface of the globe, and 39 per cent of it is under forests. Those in European Russia cover an area of 474,000,000 acres; in Finland, 50,500,000 acres; in Poland, 6,700,000 acres; and in the Caucasus, 18,600,000 acres; a total of 549,800,000 acres, exclusive of Siberia. In the Ural Provinces, forests cover 70 per cent of the area, in the northern Provinces 68 per cent, and in the four lake Provinces 57 per cent. It is estimated that in western Siberia alone, there are 465,000,000 acres of virgin forest, and eastern Siberia, while not so richly endowed, has sufficient timber to supply the world's demand for years to come.

The Government owns 285,598,941 acres of forest land in European Russia, 12,826,387 acres in the Caucasus, 360,519,435 acres in Asiatic Russia, and 288,742,000 acres in the Amur region, a total of 947,686,763 acres. Twenty-three per cent of the forest land belonged to landed proprietors and 9 per cent to the peasantry in 1910.

The principal timber lands of eastern Siberia are in the valleys of the Amur River system, which cover an area of about 2,000,000 square miles. Of this area, only about 400,000 miles is considered available for timbering, but according to local calculations, allowing 45 merchantable trees to the acre, this would give some 11,520,000,000 trees. As the time required for these trees to mature is placed at 100 years, 115,200,000 trees could be cut per annum without diminishing the forests, with proper reforestration methods.

The timber areas of Siberia are now being rapidly exploited together with

the fisheries, particularly by foreign capitalists. The Forestry Department places the total timber land in Siberia at 810,000,000 acres, of which two-thirds can be successfully placed on the market.

JOINT MEETING OF THE AMERICAN GEOGRAPHICAL SOCIETY AND THE ASSOCIATION OF AMERICAN GEOGRAPHERS

THE second joint meeting of the Association of American Geographers and the American Geographical Society was held in New York City on April 9th and 10th. It was attended by nearly half the members of the Association of American Geographers and by members of the American Geographical Society and teachers of geography in New York City. Nine papers were given, dealing with various phases of physiography and human geography. The fields discussed included the islands in the South Seas, Argentina, southwestern United States, Labrador, Alaska, and Europe. The topics included coral reefs, oases, desert basins, glaciers, and glaciated mountains. Man's activities as influenced by geographical factors were discussed in connection with agricultural industries, with war and the weather, with race geography, and with the relations of geography and history. The papers by W. M. Davis on The Coast of New Caledonia, by M. L. Fernald on The Natural History of Ancient Vinland and Its Geographic Significance, and by Bailey Willis on Argentina and the Argentines were of especial interest. An evening session at the residence of Mr. George A. Plimpton was devoted to an exhibit of early American text books of geography. Among these were many rare books of very early date; there were text books made up entirely of questions and answers, text books written in verse, a geography written by Harriet Beecher Stowe, and several geographies published in the Confederate states during the Civil War. Owing to the fact that the number of papers read at the meeting was small there was an unusual opportunity for discussion. The map exhibit by the American Geographical Society included sets of large scale topographic sheets issued by the general staffs of the larger European countries and illustrating every section of the world in which fighting has taken place during the present war. There were also maps showing the topography and geology of the Grand Canyon of the Colorado, and sheets from the new agricultural atlas of the United States now in preparation by the Bureau of Plant Industry of the United States Department of Agriculture. L. M.

FOREIGN COMMERCE OF THE LEADING PORTS

(*Combined exports and imports mostly for* 1912. *U. S. figures are for* 1913.)

	Dollars
United Kingdom:	
London	1,866,900,000
Liverpool	1,816,900,000
Hull	391,000,000
Manchester	276,000,000
Southampton	253,500,000
Glasgow	247,100,000
Grimsby	174,600,000
Harwich	168,700,000
Leith	119,900,000
Bristol	105,100,000
Tyne Ports	101,000,000
Cardiff	97,800,000
Belfast	53,000,000
Germany:	
Hamburg	1,960,700,000
Bremen	632,400,000
Belgium: Antwerp	1,214,700,000
France: Marseille	731,400,000
Havre	619,200,000
Dunkirk	207,300,000
Bordeaux	179,500,000
Italy: Genoa	295,300,000
Naples	99,700,000
Turkey: Constantinople	68,600,000
Austria-Hungary: Trieste	307,500,000
Fiume	97,700,000
Russia: St. Petersburg	136,600,000
Riga	160,500,000
Odessa	70,600,000
Vindau	61,300,000
Reval	44,900,000
Libau	52,400,000
Novorossisk	42,100,000
Nikolaiev	32,300,000
Rostov	31,200,000
Kherson	14,200,000
Batum	24,500,000
Vladivostok	21,000,000
Spain: Barcelona	91,000,000
Valencia	28,100,000
Bilbao	28,500,000

United States: New York	1,966,200,000
Galveston	289,200,000
New Orleans	252,300,000
Boston	216,100,000
Philadelphia	169,500,000
Baltimore	149,300,000
San Francisco	128,500,000
Puget Sound	114,000,000
Savannah	62,600,000
Canada: Montreal	240,900,000
Mexico: Vera Cruz	82,800,000
Tampico	63,200,000
Cuba: Habana	123,800,000
Argentina: Buenos Aires	479,500,000
Brazil: Santos	251,900,000
Rio de Janeiro	171,500,000
Chile: Valparaiso	66,800,000
Iquique	36,600,000
Antofagasta	32,700,000
Uruguay: Montevideo	75,000,000
ASIA	
China: Shanghai	185,600,000
Japan: Yokohama	235,200,000
Kobe	224,800,000
British Colonies: Singapore	269,500,000
Calcutta	447,200,000
Bombay	364,700,000
AFRICA	
Egypt: Alexandria	276,500,000
OCEANIA	
Australia: Sydney	304,200,000
Melbourne	210,100,000

[*Statistical Abstract of the United States.*]

The March *National Geographic Magazine* is almost wholly devoted to a superbly illustrated article on "Washington: Its Beginning, Its Growth and Its Future," by Ex-President Taft. There are 32 pages and two Panoramas in colors, and scores of half tones.

There is also a delightful paper on "Impressions of Palestine" by the Honorable James Bryce.

The National Geographic Society is the largest and richest Geographical society in the world, with nearly 400,000 members and assets of $370,000.

RECENT PUBLICATIONS

NORTHERN PATAGONIA, Character and Resources. By Bailey Willis. Copyrighted (1914) by the Author for the Ministry of Public Works of Argentina. Published by Chas. Scribners Sons, N. Y. Text volume (464 pp.) $6.00 net. Map volume, $2.00.

This volume has grown out of the studies and surveys made by Mr. Willis's party for the Argentine government. The text volume includes upwards of a dozen maps and the map volume contains 13 folded maps, mainly topographic. The text is illustrated with 37 plates, about half of which are beautifully executed photogravures.

The book contains a great deal of good geography and it is to be regretted that the price places it out of reach of most teachers.

Speaking of agricultural conditions the author says: "Were the farmers of the United States transplanted to Argentina they would find congenial climates and products to accord with their experiences at home in different sections of the country." The river provinces along the Parana and Paraguay and the provinces to the west and southwest are declared to be the heart of the nation, the region which will always be the seat of Argentine wealth and commerce. Irrigation to a limited degree along the Andean foothills is possible and will be profitable. Vast areas are suited only to grazing, yet much of the land now devoted to grazing will become agricultural land. Without coal, the country has little prospect of developing manufactures: "Agriculture, grazing and commerce are the activities clearly indicated as those which the Argentine nation must develop on the basis of the physical resources of the country." The forests are limited, and the valuable quebracho wood is being rapidly cut to make tanning extract. "The mate or Paraguayan tea takes a more important place in Argentine life than does coffee in North America." The conservation and proper utilization of the water resources form one of the greatest of the economic problems. The introductory chapter deals with Argentina as a whole but the remaining chapters hold rather closely to detailed descriptions of various parts of Northern Patagonia.

COLLEGE PHYSIOGRAPHY, by Ralph Stockman Tarr. 8vo. 837 pp. The Macmillan Company, 1914. $3.50.

This admirable volume is one of the latest fruits of Professor Tarr's tireless labors in the field of geography. His manuscript has been edited by Professor Martin, who has added the book and map lists, has written the seven chapters dealing with the earth's magnetism and the atmosphere, and has illustrated the entire work. It need hardly be added that to the junior author the task was a labor of love, in thus completing a worthy monument to the memory of a distinguished student of earth science. The volume is worthy to fill a large place in college instruction and is an indispensable source of help to every teacher of geography in the secondary schools.

Introductory chapters deal with the relations of the earth sciences, the history of physical geography, and fundamental facts in the fields of astronomy,

mineralogy and petrology. The physiography of the lands occupies nearly three fourths of the work. The type and heading, while offering a good and readable page, allow of exceptionally full discussion of all major topics. To rivers are given about one hundred pages, while to glaciers and glaciation a similar allotment is made. The chapters on the latter subjects reveal the exceptional experience and fullness of observation of both authors in this field. The Glacial Period occupies about fifty pages, which to the present reviewer, is amply justified, even though it be historical geology, by the need of interpreting the soils, waters and land forms of the glaciated areas, in the light of their origins and of their anthropogeographic importance. The attention to the human aspects of geography throughout the volume is significant.

The treatment of forces and reliefs is followed by a chapter on the earth's interior. This no doubt is geology, but the outline of theories regarding the interior of the globe is not more extended than will be found useful and appropriate in an advanced treatment of physical geography. The ocean and the atmosphere form the closing subjects, seventy two pages being devoted to the former and one hundred six pages to the latter theme. There is an adequate index and each chapter closes with a well selected and sufficiently full bibliography and a list of appropriate topographic maps. The illustration is in great richness and variety, numbering about five hundred maps, diagrams and half tones and several insets of parts of topographic sheets reproduced in color.

Albert Perry Brigham.

A Geographical Excursion in the Western United States

As a part of the summer work in Geography, under the auspices of Columbia University, Professor D. W. Johnson will conduct a geographical excursion in the Western United States next summer. The party will leave New York about the first of July, and will remain in the field two months. Among the places to be visited are the Devil's Tower, Yellowstone Park, Glacier National Park, the Grand Coulee, Crater Lake, San Francisco, San Andreas earthquake rift, the uplifted marine terraces at Santa Cruz, the Yosemite region, the Lassen Peak volcano and associated volcanic features; Lake Bonneville terraces, and the recent fault scarps southeast of Provo, Utah; the Hagermann Pass, the Royal Gorge of the Arkansas River, Pike's Peak and the Garden of the Gods. While in San Francisco the Exposition will be visited.

Two courses will be given: one on general physical geography and a more advanced course on the physiography of the Western United States. Attention will be directed to the economic phases of geography as illustrated by the regions visited. The courses are open to all students or teachers of geography whose application for membership may be approved by the Director. Full information regarding expenses, academic credit, and detailed plans for the trip may be obtained by addressing Professor D. W. Johnson, at Columbia University, New York City.

The JOURNAL of GEOGRAPHY

Volume XIII JUNE 1915 Number 10

SUGGESTIONS FOR THE IMPROVEMENT OF GEOGRAPHY TEACHING

Report of a California Committee Appointed in December, 1913; Report Submitted April, 1915. Roy E. Dickerson, Chairman.

I. *Existing Conditions in California Schools.*

THE Committee appointed by the Geography Section of the California Teachers' Association, Bay Section, to further the interests of geography in California, have met ten or twelve times during the past year. The outline, according to which the committee worked, was prepared after consultation and correspondence with many geographers in the United States.

The recommendations of the Committee are based upon a consideration of this outline, and upon an investigation of the actual condition of geography teaching in the California schools. It was found that many courses of study are indefinite. They lack even the prescription of a definite minimum of required work. In certain school systems geography in the last two years of the grammar schools is given a very subordinate place in conjunction with the teaching of history. Again, excellent courses of study are outlined but not enforced.

The Committee found that most teachers both in the high and grammar schools lack training for teaching the subject, because of too general certification* for high school work, and on account of the absence of any required training in the subject during attendance in normal schools. Geographic training is recognized by the Committee as the prime prerequisite of all geographic teaching.

II. *Recommendations for Training of Teachers in Geography.*

a. The Committee recommends that a year's work in geography be required of every student in state normal schools.

b. Principals and boards of education are asked to assign the teaching of high school geography to those teachers only who are qualified for the work. This is a feasible plan for the future, as the University of California is planning to recommend for the high school certificate none but those prepared to teach from two to four subjects.

c. In city systems, supervisors of geography should be appointed to aid teachers of deficient training, and to give intelligent supervision.

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*This refers to the fact that in California a person, properly certified in one subject, is entitled legally to receive a salary for teaching any other subject assigned to him in a high school.

III. *Recommendations for the Teaching of Geography in the Public Schools.*

A. Course of study

1. In the elementary schools

a. *A definite course of study should be provided.* The work should be outlined from month to month. A minimum of work which *must* be finished should be definitely stated.

b. *The Home and the State should receive that emphasis which their relative importance demands.* The work in geography should be so arranged that the pupil shall as early as possible become acquainted with the geography of his immediate environment. The more he can learn of the wide world thereafter the better it will be. But should he be unable to complete the elementary school course, at least he will be thoroughly grounded in a working knowledge of the country in which he lives and in which his activities are to be carried on.

The Home region open to observation and study should receive first and careful attention, because upon its proper understanding rests the ability to interpret and make use of the material of all future work in geography.

The whole geography course should be built upon the practical observations and experiences of the pupil. In order that the pupils may acquire these experiences, school excursions are an absolute necessity. The curriculum should be so arranged as to permit such periodic excursions without disarranging other work.

c. *Geography should continue throughout the eighth grade of the course.*

2. In high schools

a. Physical geography, with proper explanation of such elements of other natural sciences as are necessarily involved, should be offered preferably in the first year in the high school.

b. Commercial and industrial geography may be offered in the second or third years in the larger high schools, but in the smaller schools the physical geography should include a proper proportion of the above work.

B. Suggestions concerning suitable texts and equipment

1. The text book in geography should be issued in parts, the phraseology of which should be suited to the needs of the various grades.

2. Maps should be placed in an atlas in preference to being bound in the text book, for larger maps will give a clearer and more distinct representation.

3. Maps and charts should be hung upon the walls previous to undertaking the study of a country, and should remain during the time it is being studied.

4. Adequate apparatus, and a text book intended for children, should be supplied. Supplementary readers, magazines, industrial material showing methods of manufacture, and printed matter from boards of trade and chambers of commerce, should be provided in quantity.

5. Relief models are recommended as forming a very important part of the equipment for teaching geography.

6. A stereopticon and slides should be used in all the larger schools.

7. A school museum will aid greatly in elucidating many geographic facts. This is within the possibilities of every school.

C. Method of Presentation

1. In the elementary grades

a. Environment geography is recommended for the first three primary grades. This should be taken up in connection with nature study, and should include excursions. Home geography, based upon school excursions, should form the starting point of all work in the subject. Knowledge of the home as a foundation for world geography is essential. Definite and regular time should be alloted for this work in making a school program.

All the interesting points in the neighborhood should be visited and examined. The objects seen should be made the subject of discussion held in the classroom later. Such work should be made the basis of language work and drawing.

A beginning should be made in the drawing of plans to scale. Drawings thus laid off to scale, should be made of the school-room, school-house, yard, street, etc. These should be properly oriented.

b. In the fourth grade

The conception of the map as another sort of picture should be made clear. This necessitates observation on the arrangement and distribution of the geographic features of the neighborhood. These should be compared with the relief model of the same district. If no model is to be had, a rude one should be made of sand or clay. A drawing should be made of the various cultural and natural features represented on the model, as well as sketches of the features themselves made in the field.

When the meaning of the lines and other symbols on the map of the local region are thoroughly mastered, students are then prepared to understand and use maps of regions which they have not seen.

A study of the relief model of the state should then be taken up, and this followed by a study of the globe, the relief globe if possible.

General notions of the world should be gained from the study of the globe and from good maps. This study should be accomplished by stories and talks of people and things in other lands.

Pupils of the fourth grade should be given a very general notion of the State, the United States, and the world at large. Very elementary training may be given in general regional geography of the world. A knowledge of the principal land and water forms should be established. If unimportant detail be omitted, formal locational work by means of globes and maps may be learned in this grade as preparation for the advanced work of the upper grades.

c. Because of the self-evident importance of Home and State, study of California should be emphasized in the early part of the course. At least as

much as one-third of the total time allotted to geography in the elementary school should be given to Home and State. Recognizing that geography should not be a memorizing of disconnected facts, it is recommended that from the very first the efforts of the teacher should be directed toward developing an understanding of the relationship existing between the different facts studied, and the dependence of one upon another.

d. A thorough study of California should be made in the fifth grade. A study of the United States, North America, and foreign countries should follow in the sixth and seventh grades.

e. In the eighth grade more life should be put into the subject by a broader teaching of physical and economic geography based upon excursions. The work of all grades may be vitalized by a study of the influence of physical conditions—such as climate and topography—upon the development of various countries, by an enlargement of the reading references and by the use of pictures and stereopticon.

f. Time allotment of the subject should be: Grades 1 and 2—a twenty minute recitation daily; grades 3, 4 and 5—a thirty minute recitation daily; grades 6, 7, and 8—forty or forty-five minutes on alternative days. (History is frequently given on other days).

2. In high schools

Geography is to be studied from a new view point in the first year of the high school. This new view point is that of the beginner in the scientific study of causal relations. Not only are these causal relations apparent in the physical phenomena of geography, they are also evidenced in the direct control which topography, elevation, slope, latitude, etc., have upon man's occupations. The study of this control should be followed by a study of regional geography with regard to the geographic position of the various nations, and to their boundaries as natural or artificial; also by some study of trade routes and of the commerce of the world.

In the study of causal relations mentioned above it seems to the Committee that there are great opportunities to stimulate students just entering high school, but it is also recognized by the Committee that this very attempt to begin scientific study has sometimes led to the failure of physical geography. For example, the study of streams should be a study of actual meanders, flood plains, deltas, and other erosion forms seen in the vicinity or seen in miniature during rainstorms. Such study can hardly be carried to excess. The classification of streams in the technical fashion of the geologically trained physiographer as subsequent, obsequent, superimposed, and so on, in bewildering detail should be absolutely avoided in first year high school work. Similar

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*This ideal for first year work has apparently been followed to a large extent by Salisbury, Barrows, and Tower in the book *Modern Geography*. While the committee do not feel that this particular text has fully worked out the ideal, yet it best illustrates a tendency which seems desirable in re-shaping the Physical Geography course. The textbook is mentioned as characteristic of the new movement but without any specific recommendation for the use of this particular book.

considerations should prevail with the entire problem of landforms. Pictures and models must, of course, take the place of actuality in the study of essential types not found in the neighborhood, but the scientific classification should be simple and suitable to the age of the pupil and *not* be the classification of the university-trained investigator.

In the study of such elements of the other sciences as are found in physical geography an illustration may be offered. Oxygen may be made while studying the atmosphere and experiments tried to test its properties, but chemical explanations should be the simplest, and should be confined as closely as possible to the geographic problems involved. Similarly the pressure of the atmosphere is naturally to be studied with the help of a mercurial barometer set up before the class, with other simple experiments. In both instances, however, the primary object is geography and the secondary object is to make such slight excursions into the fields of chemistry, physics, and other sciences as shall enable the student to find himself, and to appreciate the relations of the other natural sciences to geography.

THE GEOGRAPHER'S NEED OF TRAVEL

"TO be equipped fully to study his subject the geographer must needs travel here and there to see different types of regions and get a first-hand acquaintance with them; to examine on a map and through the medium of other people's observations must be looked upon as a makeshift in place of an ideal, and one that can lead to satisfactory results only with exceptional minds. No doubt much of the geographer's knowledge must be acquired in this way, but nevertheless he must deplore the restrictions in his wanderings. Before he can hope to acquire any moderate degree of competence in research or exposition, he must see and examine at least certain types of land forms, experience certain types of climate, and live among certain formations of vegetation and their correlated types of human activity. The relation of man to his organic and inorganic setting can never be appreciated fully without some firsthand experience of varying conditions of environment. Otherwise the obvious facts will probably be lost sight of. Actual knowledge of and contact with the living world is essential for an understanding of the complexities of human interpendence with nature, and it alone can safeguard the geographer from the dangerous pitfalls of intellectual abstraction."

"And that this travel should be beyond the centres of our complex civilization is also important because geographical facts should first be looked for where they are most obvious, which is in primitive communities still in intimate relationship to their immediate environment."—*R. N. R. Brown.*

AN AESTHETIC SIDE OF GEOGRAPHY—BEAUTY IN LANDSCAPE FORMS

By Richard E. Dodge
Teachers College, New York City

THE grand scenic features of our land, and of others known to travelers, have been described fully and seemingly adequately in prose and verse and often in language that is classic. A few writers, whose ways have led them among scenes of great beauty, neither awe-inspiring nor grand, have made known to us the possibilities of joy and inspiration to be gained from looking peacefully and sympathetically upon the little rivers and the small hills that make up their favorite landscape. We have at our service splendid accounts, written in appealing and effective form, of the Sierras, the Yellowstone Canyon, the Grand Canyon of the Colorado, and of Niagara—accounts which lead us to marvel at the grand scale on which nature has worked, and at the wonderful play of colors to be seen in rocks and water under varying intensities of sunlight.

Yet in most landscapes, size and color are only two phases of a many phased beauty, and in many cases the size even fades into insignificance; for when we look closely, the controlling element is that of form. In our mountains, majestic in size, symbols of permanency, stability and strength, seemingly unchanged by the passage of the ages, the impressive and inspiring feature to him who looks with understanding, is the beauty of outline. Each peak and ravine has a form, individual and appealing, over which the shadows play like the smiles and frowns in a human face.

When the profiles are rugged and the lines steeply inclined, the very uprightness of the slopes suggests a strength and power behind the form that give beauty and quality to the mountain mass, even though no single line is artistically pleasing, if studied alone. When, as in certain portions of the Rocky Mountains or the Southern Appalachians, the slopes are gentle, the forms broad and rolling, there is a quietness and repose that is beautiful in the extreme. Such slopes catch and hold the eye by their symmetry and strength and, beautiful in themselves as individual lines, are still more beautiful when, back of the individual lines, is seen the massive nature-sculpture of which every line is a necessary part.

The White Mountains, in New Hampshire, are impressive for their calm majesty, their rolling profiles and their solidity as an unit group. Here the forest cover, the play of shadows as the clouds roll about the summits or the storms rage even into the low-lying valleys, present color effects that appeal to the man who is impressed most vividly by color changes. But back of the superficial changing hues are the "everlasting hills," whose profiles are as they have been through the memory of man, beautiful, dignified and awe inspiring. He who looks out on such a landscape may be charmed and thrilled by the fleeting visions of color that baffle description or reproduction, but the vision

was for a moment and can never be experienced again. It is remembered for the pleasure it gave, but it can not again be seen as a mind picture, clear in detail and strong in outline, as was the momentary vision of beauty. No! the permanent impressions and memories brought home from a mountain—any mountain—are the outlines which never change from visit to visit, which can be engraved on the memory and recalled by the will at any time. It is the beauty of profiles and form that is the permanent pleasure brought away from an intimate life in such a region.

What is true of these mountains is equally true of any mountain area. The scraggy front of the flat topped Catskills or the Cumberlands, with their low-lying peaks of regular and yet varied form, present profiles of equally great beauty, though every line is different from the profiles seen in more varied landscapes. Mountain profiles, in fact any landscape forms, have an added charm and are more rich and suggestive to him who realizes that these profiles tell a story and reflect the life history of the landscape, just as the lines of care, worry, joy, peace and human sympathy in a beloved face reflect the life history of a friend. To look at a land form, not as a chance thing of the present human epoch but as a result of long ages of existence from the human standpoint, is to put yourself in sympathy with it, to feel in touch with the earth and to get a new comprehension of time and of the immutable earth processes which are carving lines of character and of strength or weakness in the great features of the earth.

Landscape forms impress themselves upon our minds more than we realize until change takes us into a new country where every line is unfamiliar and every outline strange. Homesickness is largely longing for the beloved landscape, whether it be the gently rolling slopes of the prairies, the absolute uniformity of some of the great plains of our country, the mighty towering peaks of the mountains, the flat profiles of the plateaus or the long flowing curves of the sandy beach.

The great charm of any landscape, which is looked at impartially and with no thought of the human associations of plenty and pleasure, want or harshness of life, is as much a beauty of form as of color. We can not divorce the two phases of landscape beauty, but surely one needs as much emphasis and attention as the other. Some surface features present as beautiful profiles and masses as any of the great statues of the masters of sculpture. Whoever has viewed the convex outlines of a perfect sand dune, fluted into thousands of minute ridges by the wind, carries away a memory of a mass of curves as beautiful as any that can be drawn or moulded. Yet these forms have been produced by chance blowings of the wind over millions of particles of sand, formed by one of the great forces of nature working quietly, everlastingly, and with varied emphasis through the years. The dune of today will change by the morrow and is as fleeting in outline as the form of a cloud we watch in the summer sky. Whatever its form, it is always beautiful, if the winds have had

free sway and abundance of material to work upon. To become really acquainted with a series of sand dunes, to know their forms, to read their history, to become steeped with their beauty, is to put oneself in sympathy with nature and to feel a reverence for her works that one can not feel as he faces many of the great works of mankind.

Wherever we go we can see landscape features, great and small, presenting outlines and forms that appeal to the attuned eye because of themselves and not primarily because of the colors which they present. This is especially true over a large part of the northeastern United States where the surface features are dignified, rather than majestic, but where variety of form gives an individuality and a beauty that baffles description. Even our favorite hymn, America, reflects in its stanzas the beauties of the New England landscapes, with "its rocks and rills, its woods and templed hills," and Whittier in several of his poems has pictured for us the quiet scenes, the attractive outlines, and the appealing visions of eastern New England. Here in our very midst are beauties beneath our feet that are little appreciated because so familiar. The smooth, rolling hills of the vicinity of Boston, with their convex curves in every profile and their perfect lenticular form, are among the most attractive features which can be found in any region. Majesty they lack, but yet there is a quiet dignity of outline that suggests slumbering strength and an inscrutable history that challenges the human mind. These hills are usually free from tree growth and, where not disfigured by the pigmy habitations of man, stand out in profile against the sky in low, broad curves that can never be forgotten and will always be loved by him who knows them as a friend.

In the eastern part of our country the color effects of tilled fields or forests often overshadow the beauty of form unless we look carefully; but where, as in the semi-arid regions of the west, the vegetation cover is less dense or even lacking, the beauties of form stand out with great clearness. He who has ridden across the Great Plains of Nebraska, Colorado, or Kansas has been impressed in one of two ways. If the traveler is unhappy when he is out of touch with mankind, he looks upon the Plains as a great, horrid, barren area, unfriendly to man and disagreeable in every feature, and yet which must be endured in as quiet agony as possible. If, however, he has an eye for form and color, these same plains will be a source of constant pleasure, not only during the journey but so long as memory brings their outlines clearly to mind. The gently rolling hills that stretch off in low billows to the horizon, like a great earth ground swell, suggest the infinite as do few features in the world. To look out on these great waves of form, succeeding one another in unending procession, and yet without monotony, to the edge of things, is to get an impression of large scale beauty, of the vastness of the world and of the infinitely small part that a human individual plays therein, that is almost overwhelmingly in its sweep. Here the beauty of form is supreme and only the mentally blind can fail to be impressed by that beauty. Detail is lost in the

vastness and dignity of the whole and the mind is opened to conceptions of time and space, as in a mountain region, but perhaps more easily because of the great unity of the whole which is the most striking feature of such a landscape.

Even in those regions that are absolutely flat, where the vision is limited only by the curved horizon, where it would seem as if there could be no beauty because of the absolute uniformity of features, there is a beauty that is most impressive to one who looks on such a place as a sculptor would on a perfect statue. The evenness of slope, the uniformity and the vastness are sources of wonder and inspiration that make a lasting impression. If the level stretches are covered by fields of wheat or grain, as they are in the vast flat plain of Minnesota and Manitoba, then color is added to form and the total impression is one of the most thrilling to be gained in any part of our country. Color effects add vastly to the beauty of any landscape, but color and size must be studied with form if we are to get the most from any landscape.

To be able to see landscape forms is one of the great pleasures of life and yet it is a pleasure that few seem consciously to cultivate. Everyone may be impressed by color combinations in nature and may be thrilled with emotion which he may try to voice in words. The grandest color spectacles of the scenic world impel one to silence, however, for they can not be described and they are on too vast a scale to be seen at a glimpse. Through the color we feel the hand of nature and we realize that these vast color schemes are on a scale that man can not duplicate and which he can never understand or wholly analyze.

When one looks on land forms he does not need to face any of the great landscape features of the world to be thrilled to silence and reverence, for every land has its own beauty, bespeaking an individual history. The smallest land form—maybe the minute ripple mark by the sea that is washed away by the next tide, or the curve of the river bank that changes with the hours—has an inherent beauty no less majestic or awe inspiring than the mighty Matterhorn or the towering crags that face some shore as a great advance rampart of the land. Every land has its beauties of form, impressive, appealing and beyond human understanding or complete appreciation. If they be analyzed into their parts from a purely artistic standpoint, like the curves of ancient architecture, they have an artistic force that is striking. If they be viewed as wholes and behind the forms there be seen in suggestion the long life history that each form may reveal in a fragmentary way to the sympathetic and understanding inquirer, they offer a source of pleasure, joy and profit to all.

To know one's landscape, to feel in sympathy with it, is often to be at peace with life. When all the world seems wrong and the burdens overwhelming, he who can look out on the familiar fields and hills or get among them and give way to their beauties of form and color has a resource within himself that will be an ever present power of recuperation.

SCENIC ROUTES TO THE PACIFIC COAST

By R. H. Whitbeck
University of Wisconsin, Madison

THERE are three reasons why an unusually large number of teachers will go to the Pacific Coast this summer:

1. The Panama-Pacific Exposition at San Francisco,

2. The meeting of the National Education Association at Oakland, Aug. 16-28.

3. The undesirability of European travel.

Moreover, the "See America First" slogan has undoubtedly converted many people. There are no less than nine routes by which one may go to the Exposition or return. Many people living near the Atlantic seaboard will be attracted by the Panama Canal route. The Panama Pacific Line, (Broadway, N. Y.) operating the *Finland* and the *Kroonland,* is offering 17-day cruises through the canal from New York to San Francisco or return. If the passenger prefers, he may travel one way by rail, on a round trip ticket. Doubtless other steamship lines are offering similar trips. Persons living near the Gulf or within easy reach of New Orleans will have a choice between the canal route and the railroad journey over the Southern Pacific. The latter can hardly be classed as a scenic route, and the hot summer journey may not seem especially attractive. While not the preferred route for reaching the Grand Canyon of the Colorado, one may, with some loss of time, reach this greatest of chasms by leaving the Southern Pacific at Maricopa and traveling northward.

The direct route from the East to the Grand Canyon is by way of the Atchison, Topeka and Santa Fe. At least two days should be allowed for a stop-over at the Canyon. The petrified forests of Arizona* are also reached by the Santa Fe Route. The southern routes are, of course, warmer and the mountain scenery is less impressive than by the central and northern routes, yet the Grand Canyon of the Colorado is one of the most wonderful places in all of our western Wonderland.

Several railway lines lead from Chicago or St. Louis to Denver, and the scenic features, so far as there are any, are much the same by the different routes. Two direct lines connect Colorado with the Coast. The Union Pacific and the newer line made up of the Denver and Rio Grande and the Western Pacific. The direct line of the Union Pacific avoids the Colorado mountains, bending northward through southern Wyoming. It is the quickest of the routes from Chicago to San Francisco, but has none of the famous scenic features along its main line. By leaving the main line at Ogden or at Granger and taking the Oregon Short Line northward, the Yellowstone Park may be reached; from the east, this route is less direct than that by the Northern Pacific. The scenery in the Sierra Nevadas along the Union Pacific

*See map and description, *Journal of Geography*, Vol. XI, p. 329. (June, 1913).

route is grand, but the long ride through the miles and miles of smoke-filled snow sheds was the most disagreeable railroad journey the writer ever took.

The other central route from Denver takes you to Salt Lake City by the Denver and Rio Grande, thence to San Francisco by the recently completed Western Pacific. The second portion of this route is closely parallel to the Union Pacific and affords substantially the same scenic features. The journey from Denver to Salt Lake City is one of superb mountain scenery. The journey has been described as follows:*

"From Denver to Pueblo, 120 miles, the Denver and Rio Grande runs south, with the Front Range of the Rockies on the west and the Great Plains stretching off to the east. Between Denver and Pueblo is Colorado Springs from which a branch line leads to Manitou. The famed Garden of the Gods is a short distance out of Manitou and Pike's Peak is reached by a cog railroad. The Ute Pass and North and South Cheyenne Canyons are also easily reached."

"At Canyon City, the road enters one of the most wonderful defiles of the West,—the Royal Gorge of the Arkansas. It is ten miles long, a half mile deep, and very narrow (only 30 feet in one place). Special open-top cars are used in summer for the canyon trips."

"Fifty miles beyond the Royal Gorge, the railroad forks, the main line crossing the continental divide by way of Tennessee Pass, and the narrow gage line crossing it at Marshall Pass; both passes are over 10,000 feet high, and a mile above the Arkansas River at the Royal Gorge. The main line, after zig-zagging over Tennessee Pass, runs through Red Cliff Canyon, near the Mount of the Holy Cross, into the Eagle River Canyon, with its cliff walls, 2000 feet high, honeycombed with mines. Farther on is the narrow canyon of the Grand River, with almost vertical cliffs 2500 feet high, Glenwood Springs, Grand Valley, and Grand Junction, one of Colorado's widely known irrigated orchard regions. At Utaline, midway of the Ruby Canyon, the railroad passes into Utah."

There are four northern routes,—three in the United States and one in Canada. Of these the Chicago, Milwaukee & St. Paul is a recently built line and is least known to tourists. It runs from Chicago, via Milwaukee and St. Paul, across South Dakota, through Central Montana, across Idaho and Washington to Seattle. While it offers much the same types of scenery as do the other northern routes it has no single outstanding feature such as the Yellowstone Park on the Northern Pacific or the Glacier National Park on the Great Northern Railroad.

The Northern Pacific route was the one selected by the International Geographical Excursion of 1912‡. This line uses the Chicago, Burlington & Quincy between Chicago and St. Paul. It crosses central Minnesota, and the premier wheat lands of the Red River Valley, North Dakota, Montana,

Journal of Geography, Vol. XI, p. 306. (May, 1913).
‡*Journal of Geography*, Vol. XI, p. 105. (Nov., 1912).

Idaho and Washington to Puget Sound ports. The main line runs close to the Yellowstone National Park, the Park trains branching off at Livingston, Mont.

The Yellowstone National Park is by all odds the place of most varied scenery in the Cordilleran region. The Grand Canyon of the Yellowstone does not equal in grandeur the Grand Canyon of the Colorado, but the canyon is only one of many features of the park. Writing of the geysers, Prof. N. M. Fenneman says:** "The one thing which, above all others, makes Yellowstone Park a wonderland is its geysers . . . They vary in quantity of water erupted from a few gallons to thousands of barrels; in height of eruption from several feet to several hundred feet; in period from a half minute to a few weeks or even longer. Some play at regular intervals for many years, others at irregular intervals. Some throw a straight vertical shaft of water (except for the effect of wind), others discharge obliquely or throw out an irregular mass or sheet of water. Some receive back their waters into their own basins to be erupted again, others not. Some have wide open basins with the orifice at the center and lowest part, others spout from the apex of a cone built of siliceous deposits made by the water, others still have irregular mounds."

Besides the geysers and the Canyon, the Park includes a score of other notable features; among them the Mammoth Hot Springs and their beautiful terraces, the exquisitely tinted pools, the petrified forests, the obsidian cliff, Yellowstone Lake, the falls, the fumeroles, and man's masterpiece of rustic construction, Old Faithful Inn. The tour of the Park requires five days, and the cost varies from $5.00 to $10.00 a day. Reliable information regarding the Yellowstone Park, and methods and cost of seeing it, is contained in a government bulletin listed at the end of this article.

The Great Northern Railway is roughly parallel to the other northern routes. It uses the Chicago, Burlington and Quincy from Chicago to St. Paul and terminates at Seattle. Its mountain scenery is substantially like that of the Northern Pacific and of the Chicago, Milwaukee and St. Paul, but inferior to that of the Canadian Pacific. The Glacier National Park is reached by this route. Writing of this Park, Prof. Lawrence Martin says:* "Here one may see glaciers, as the name suggests, and although they are not as large as those on Mount Rainier, which contains the largest ice streams in the United States, they are in no way inferior to the glaciers along the Canadian Pacific Railway a little farther north. They are smaller than the ice tongues of the Alps and are mere pigmies compared with the glaciers of Alaska, but the Blackfoot Glacier and its neighbors in Glacier National Park are perfectly typical and to Americans they are very accessible."

The Canadian Pacific route is considered to have the most striking mountain scenery. Where this line crosses the Front Range of the Rockies near Banff and where it crosses the Selkirks farther west, the mountains are magni-

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**_Journal of Geography_, Vol. XI, p. 314 (June, 1913).

*_Journal of Geography_, Vol. XI, p. 324. (June, 1913).

ficent in their grandeur. The Crow's Nest branch of the Canadian Pacific affords the finest of the scenery. The line terminates at Vancouver.

All of the lines issue beautifully illustrated booklets which are either mailed free or at a nominal cost. Offices are maintained in all leading cities. Main offices of the various roads are located as follows:

The Southern Pacific at New Orleans.

The Atchison, Topeka and Santa Fe, the Union Pacific, and the Chicago, Milwaukee and St. Paul at Chicago.

The Denver and Rio Grande and Western Pacific at Denver.

The Northern Pacific and Great Northern at St. Paul; and

The Canadian Pacific at Montreal or Winnipeg.

Booklets and other information may be obtained by addressing the respective General Passenger Agents at these places.

Members of the U. S. Geological Survey are preparing geographical and geological guide books for use along the three Land-grant roads, namely, the Santa Fe, the Union Pacific, and the Northern Pacific. These guide books will be more than mere booklets for tourists. They will be carefully prepared descriptions of the geological and geographical features of the country traversed by these railways; they are written by prominent members of the Geological Survey, are illustrated with maps, cross-sections and half tone views and are written for the general reader, not simply for the geologist. These guide books will be sold for 50c and may be obtained by sending the amount in coin or money order, to the Director of the U. S. Geological Survey, Washington, D. C.*

Two special numbers of the Journal of Geography may be of interest to persons who plan to visit the Coast this summer. These are The California Number (June, 1911) and the Summer Travel Number (June, 1913).

CONTENTS OF THE JUNE, 1911, NUMBER

Geographic Influences in the Development of California.....
.....*James F. Chamberlain*
Topographic Environment of San Francisco.....*Ruliff S. Holway*
The Yosemite Valley.....*Mabel B. Peirson*
The Sequoias .....*T. P. Lukens*
The California Oil Industry.....*Ralph Arnold*
The Raisin Industry in California.....*Edna E. Rowell*
The Geographical Determinants of Los Angeles.....*W. H. Snyder*
Lake Tahoe, California-Nevada.....*George D. Louderbach*

CONTENTS OF THE JUNE, 1913, NUMBER

The Grand Canyon of the Colorado.....*W. M. Davis*
The Yellowstone National Park.....*N. M. Fenneman*
The Grand Coulee of Washington.....*R. E. Dodge*
Mount Mazama and Crater Lake.....*Lawrence Martin*

*None of these booklets will be ready for distribution before June 20.

Glacier National Park.....*Lawrence Martin*
The Yosemite National Park, Extracts from U. S. Geological Survey by F. E. Matthes.
The Petrified Forests of Arizona.....*F. E. Williams*
A Thousand Miles Through Colorado.....*R. H. Whitbeck*
Mammoth Cave.....*R. H. Whitbeck*

Either of the above issues of the magazine will be sent postpaid for 10 cents. See also the list of National Park publications following this article.

RAILROAD RATES TO THE COAST

In general the round-trip rates are as follows:

Chicago, Ill.	$ 62.50
Indianapolis, Ind., and Louisville, Ky.	67.10
Detroit, Mich.	73.50
Buffalo, N. Y.	81.10
St. Louis, Mo.	57.50
Cincinnati, Ohio	70.25
Cleveland, Ohio	74.50
Pittsburgh, Pa.	79.30
Wheeling, W. Va.	79.00
Omaha, Nebr., Council Bluffs, Iowa, and Leavenworth, Kans.	50.00
St. Paul and Minneapolis, Minn.	63.85
Little Rock, Ark., and New Orleans, La.	57.50
Ft. Worth and Dallas, Tex.	52.50
Denver, Colo.	45.00
Salt Lake City, Utah	35.00
New York, N. Y.	101.00

Tickets sold at these rates are good for a round trip by direct routes including San Diego, Los Angeles, San Francisco, and Oakland on the western coast. Where it is desired either to go or to return via the northwest route, taking in the cities of Portland, Seattle, Victoria, and Vancouver, an extra $17.50 is added to the rates quoted for direct routes. All tickets sold are good for a three months' trip with stopover privileges in either direction within the limits of ticket at all points west of Chicago.

To all teachers who attend the Panama-Pacific Exposition in San Francisco Ginn and Company are extending a cordial invitation to visit their exhibit in the Palace of Education. In this exhibit there are displays showing how textbooks are made, striking facts about the textbook business, motion pictures, and an interesting collection of early American schoolbooks. There is also a rest room with chairs, tables, desks, etc.

An attendant who is familiar with all the details of the Exposition will render any possible services.

Teachers who are not yet sure of their San Francisco address may find it convenient to have mail sent,—Care of Ginn and Company, Panama-Pacific Exposition, Palace of Education, San Francisco.

NATIONAL PARK PUBLICATIONS

DISTRIBUTED BY THE SECRETARY OF THE INTERIOR

THE following publications may be obtained free of charge from the Secretary of the Interior, Washington, D. C.:

List of national park publications. 28 pp. An annotated list of books, government publications, and magazine articles on the national parks.

National park pictures collected and exhibited by the Department of the Interior. 16 pp. A descriptive list of pictures exhibited at public libraries by the Department of the Interior. Contains short descriptiions quoted from well-known writers but does not contain illustrations.

The following information circulars contain data regarding hotels, camps, and principal points of interest, lists of books and magazine articles, sketch maps, and rules and regulations:

General information regarding Yellowstone National Park. 32 pp.

General information regarding Yosemite National Park. 22 pp.

General information regarding Mount Rainier National Park. 22 pp.

General information regarding Crater Lake National Park. 10 pp.

General information regarding Mesa Verde National Park. 24 pp.

General information regarding Sequoia and General Grant National Parks. 24 pp.

General information regarding the Hot Springs of Arkansas. 8 pp.

General information regarding Glacier National Park. 10 pp.

SOLD BY THE SUPERINTENDENT OF DOCUMENTS

The following publications issued by the Department of the Interior are for sale by the Superintendent of Documents, Government Printing Office, Washington, D. C.:

Geological History of the Yellowstone National Park, by Arnold Hague. 24 pages, including 10 illustrations. 10 cents.

Geysers, by Walter Harvey Weed. 32 pages, including 23 illustratoins. 10 cents.

Geological History of Crater Lake, Oregon, by Joseph S. Diller. 32 pages, including 28 illustrations. 10 cents.

Some Lakes of Glacier National Park, by M. J. Elrod. 32 pages, inculding 19 illustrations. 10 cents.

Sketch of Yosemite National Park and an Account of the Origin of the Yosemite and Hetch Hetchy Valleys, by F. E. Matthes. 48 pages, including 24 illustrations. 10 cents.

Analyses of the Waters of the Hot Springs of Arkansas, by J. K. Haywood, and Geological Sketch of Hot Springs, Ark., by Walter Harvey Weed. 56 pp. 10 cents.

Proceedings of the National Park Conference held at Yellowstone National Park, September 11 and 12, 1911. 210 pp. 15 cents. Contains a discussion of national park problems by officers of the Government and other persons.

The Secret of the Big Trees: Yosemite, Sequoia, and General Grant National Parks, by Ellsworth Huntington. 24 pages, including 14 illustrations. 5 cents. Contains an account of the climate changes indicated by the growth rings and compares climate conditions in California with those in Asia.

Remittances for these publications should go by money order, payable to the Superintendent of Documents, Government Printing Office, Washington, D. C., or in cash. Checks and postage stamps can not be accepted.

THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION

THE Panama-Pacific International Exposition was formally opened on the scheduled date, February 20, 1915. This glorious record of present day achievement was complete from blooming flower beds and paved roads to tinted domes and turrets.

The Exposition as opened is a reflection of the advance made by the nations along all lines of human endeavor since the St. Louis Fair. The Exposition is universal, which means that it shows the best in all of the world. The keynote is progress; not with an historic spirit that carries one back to the beginning, but with the spirit of the last ten years. This is the more important because of the event it celebrates—the completion of the Panama Canal. The Exposition itself had its beginning when, on February 15, 1911, President Taft signed the bill that recognized San Francisco as the city in which to hold the Panama completion celebration.

The site was chosen in July,—635 amphitheatrical acres along the shores of San Francisco bay just inside the Golden Gate. This is about two miles and a half long with an average width of a half mile. To the east is Fort Mason with its government fortifications, while to the west is the Presidio. San Francisco, like Rome, has been built on seven hills, and it is these that form the natural background. It takes one but twenty minutes to travel from the heart of San Francisco's cosmopolitan shopping district to the gates of the Exposition grounds.

The architecture is a blending of the old and new, an embodiment of the location and color of the best. The whole plan has been comprehensively grouped in three divisions: the west with its pavilions of nations, state buildings, and Live Stock Section; the east with its amusement section, here called the Zone; the central part with the Eleven Main Exhibit palaces.

Twenty-eight foreign nations are represented in the western section, Argentina, Austria, Australia, Bolivia, Belgium, Canada, Cuba, China, Denmark, France, Greece, Guatemala, Great Britain, Germany, Honduras, Holland, Italy, Japan, New Zealand, Norway, Persia, Portugal, Switzerland, Siam, Turkey, and Uruguay. This includes not only exhibits in the main palaces, but in most cases a separate building of great cost.

Alabama, Arkansas, California, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Minnesota, Mississippi, Missouri, Montana, Nevada, New Jersey, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Philippines, Texas, Utah, Virginia, West Virginia, Wisconsin, and Washington are the states and territories officially represented. Of these the California Host Building, which is an investment of over two million dollars, is the largest. It covers five acres and is built in characteristic Spanish Mission style. In it are located the exhibits of the fifty-eight counties as well as the various offices and social headquarters of the state people.

The most westerly 65 acres of the Exposition area is given up to the Live Stock department, where special events along all lines of the exhibit will be displayed. The appropriations for live stock premiums total over $250,000 and prize money over $425,000. Even the barns, with their excellent planning and model construction, are a part of the exhibit of the industry.

The concessions in the east cover another 65 acres. Here may be found amusements of all kinds and descriptions, educational and fun provoking. More than $12,000,000 has been expended along an area divided by a 3,000 foot avenue. Nearly all of these displays are unique, something new that the world has never been able to enjoy before.

The Main Exhibit palaces are devoted to Education and Social Economy, Liberal Arts, Manufactures, Varied Industries, Mines and Metallurgy, Transportation, Agriculture, Food Products, Fine Arts, Machinery, and Horticulture. Of these the last three are rather apart from the main group, which is laid out in the form of a Greek Cross. The Palace of Machinery is at the east, the Palace of Fine Arts at the west, the Palace of Horticulture to the south along with Festival Hall. Festival Hall is not a real exhibit palace. It has an Auditorium seating 10,000 people. In this palace will center the great music events, for the exposition has given particular attention to that feature.

The eight connected groups of palaces—Varied Industries, Manufactures, Liberal Arts, Education, facing south, and Mines and Metallurgy, Transportation, Agriculture, and Food Products facing north on San Francisco Bay—are connected by colonnades and five wonderful courts: Court of Abundance, Court of Flowers, Court of the Universe, Court of the Four Seasons and the Court of Palms. The Court of the Universe is the center for the entire exposition—a glorious court entered into under the Tower of Jewels. This tower is the dominant feature of the entire area. It is 435 feet high, with seven levels of graduated areas, each ornamented with sculptural features and hung with 135,000 scientifically cut glass jewels, possessing extraordinary refracting power. These give out marvelous colors in the glorious California sunlight by day, and at night distribute their beauty under shifting beams from scintillators. Everywhere the lights are a mass of concealed electricity softly displayed. Probably of all the wonders of the exposition the

illumination marks the greatest advancement. Each court has its own lighting scheme. No where is there present the familiar glare of exposition lights flashed upon white surfaces.

A unified color scheme has been planned and adopted under the direction of Jules Guerin, the famous colorist. He has marked out a goal of achievement which no other affair of its kind has ever reached.

Eight colors are used to decorate the ivory tinted color of the buildings, all of which are finished to represent Travertine stone. The garden lattices are French green, the flag pole, a characteristic Guerin orange-pink, the colonnades have a back ground of pinkish red and brown, the vaulted ceilings and recessed panels are deep cruelean blue, the small domes and mouldings are golden burnt orange, while urns are verde-antique and statuary gold.

The flower gardens, twenty-four in number, are planned to conform to the general color scheme. Each six weeks the entire plantings are changed and flowers of another color come into bloom, with a back-ground of forest trees and palms.

A radical move in the world of art was made in the installing of exterior mural paintings. There are nineteen of these, each distinctive in design but uniform in the use of color. They are distributed; one in the Court of Abundance by Frank Brangwyn, six in the Court of the Four Seasons by H. Milton Bancroft, two in the Arch of the Court of the Universe by Edward Simmons, two in the Tower of Jewels by William de Leftwich Dodge, two in the Court of the Universe, the western by Frank Du Mond, the eastern by Edward Simmons, two in the Court of Palms, Fruit and Flowers, by Childe Hassam; the Pursuit of Pleasure by Charles Halloway, and four in the Rotunda of the Palace of Fine Arts, by Robert Reid.

The sculpture of the Exposition has been gathered together by the work of 42 people, three women and thirty-nine men.

There are nine fountains, each an aquatic triumph. The Fountain of Energy by A. Sterling Calder, the Fountain of Earth by Robert I. Aitken, the Fountains of Rising Sun and Setting Sun by Adolph A. Weiman, the Fountain of Youth by E. B. Longman, the Fountain of El Dorado by Mrs. Harry Paine Whitney, the Fountain of Ceres by E. B. Longman, the Fountain of the Four Seasons by Furio Piccirille, the Fountain of Beauty and the Beast by Edgar Walter.

Of the equestian statues Cortez by Cary Rumsey, the End of the Trail by James Earl Fraser, and the Pioneer by Solon Borglum, will stand out in one's mind with wonderful clearness. Nothing, however, will carry the spirit of life and strength to one as the two heroic groups on the arches of the Court of the Universe—the Nations of the West and the Nations of the East by A. Sterling Calder.

There are more than 500 pieces of sculpture throughout the grounds, from the majestic figures to bas relief and each one is perfection in itself.

The exterior of the main group of buildings is decorated to mark the various epochs in architecture. The south wall in Renaissance of Italy and Spain, the west wall in the same style up to the time of Spanish distinctive architecture, the water-facing side of the group with California decorations of early explorers and historical figures of importance. The Palaces of Machinery and Fine Arts are of Roman style, the Horticulture building of Saracenic origin and Festival Hall resembles the Parisian Theater of Beaux Arts.

Nor is the beauty kept to the exterior of the buildings and grounds, nor even inside the fence, or more properly speaking the wall that encloses the ground. This wall is some twenty feet high, a mass of growing plants that bloom throughout the year. Inside the buildings the greatest efforts have been made to secure pleasing and unique features. The old idea of the most in the least space has given way to tasteful arrangement and gratifying presentation.

With all it is a dream city, color, light, sculpture, flowers, and architecture, all combined with California hospitality and climate in offering to the world the twelfth international exposition, the third ever held in the United States and by far the greatest display of beauty and advancement that has ever been presented.—[Ardee Parsons in April *Sierra Educational News*].

THE WEATHER FACTOR IN THE GREAT WAR; LATE WINTER AND SPRING*

By Robert DeC. Ward
Harvard University

IN the eastern zone the Germans seem to have been especially quick to take advantage of hard roads and frozen marshes for making their advances, during cold spells, probably because, last autumn, they lost many men in a sudden thaw which made retreat difficult. The heavy German armored motors have given endless trouble, while the lighter Russian motors, weighing about one-fifth as much, have proved far more serviceable on the muddy roads. While the ground was snow-covered, the German officers' automobiles in Poland were provided with snow plows. Von Hindenburg's great advance in East Prussia, early in February, which resulted in the capture of large numbers of Russians between the "jaws" of a German "trap", failed of being more completely successful by reason of a change in the weather. The advance began over hard ground and frozen swamps. A sudden thaw turned vast lowland areas into seas of mud and of icy water. The northern "jaw" of the German "trap," being delayed because of these handicaps and its longer march, failed to meet the southern "jaw" on time, and through this gap

*In a previous article in this *Journal*, Vol. xiii, 1915, Feb. and Mar., pp. 169-171, 209-216, the writer considered the period Nov. 1 to Feb. 1. The present paper covers the most important events from Feb. 1 to May 1.

about one-third of one Russian army division escaped. The German pursuit was greatly hampered. Provision and ammunition trains stuck fast, and supplies had to be carried on sledges in the teeth of a furious snowstorm. The rapid advance of spring in this area, with the general melting of recent heavy snows, made immense stretches of lowland impassable—shallow seas, with treacherous bogs beneath. At the end of March a whole German army corps, which had crossed the thin and melting ice of one of the East Prussian lakes, found a return impossible, and suffered heavy losses (Petrograd despatch).

The desperate fighting in the Carpathians continued through March without substantial gains by either side. The Russians then began a great forward movement, under terrible weather conditions, the men having to march and to draw their guns through waist-deep snows. This advance distinctly slackened after three weeks of obvious success, but whether this slackening was due to the spring rains and floods and prohibitory weather and transport conditions, or to the activity of the Austrian and German armies, is not clear. Petrograd despatches assert that the Russians gained all that they expected to before the spring thaws set in. Toward the end of April, fine spring weather without the hampering effects of cold, snow, ice, and short rations, stimulated military activity in this region. If the weather had not interfered, said a Russian officer, his troops would have advanced far into Hungary early in the winter. The complete story of the winter campaign in the Carpathians can probably never be written. The deep snows buried hundreds of dead, whose bodies were revealed whenever a thaw set in. The melting snows froze at night, and the early morning fighting began over huge fields of ice. The deep snows had an important effect in increasing the mortality. The only way to advance was on beaten paths, in Indian file, which formation obviously involves heavy losses, as the men can be picked off one by one. Had the Russians succeeded in gaining the southern slopes of the Carpathians late in the winter, the earlier spring in that region would have favored their rapid advance into Hungary.

The weather played an important part in the siege of Peremysl. The fortress was kept in touch with the outside world by means of aeroplanes, which brought despatches and food. When the Austrians were holding back the besieging armies in September the roads became practically impassable. Therefore the wounded from the battle of the San had to be left in Peremysl instead of being sent south, as was the plan. This extra number of persons hastened the exhaustion of the food supplies. Further, after the "mildest December known in years," a very cold January and February snowed up the Austrian troops and left Peremysl to its doom. The Russian retreat from Bukowina, about mid-February, was necessitated by the danger of the troops being cut off by floods. Similarly, the plan of a fresh Austrian invasion of Serbia, early in February, was abandoned on account of the spring floods.

In the western war zone, during the capture of Les Eparges by the French early in April, the heavy rains and deep mud made artillery and rifles

useless, and bayonets were used in storming the trenches. The English advance to Neuve Chapelle was followed by a period of relative inactivity, because of the impassable condition of the roads, which prohibited artillery manoeuvres. The advance of spring, the drying of the ground by warm winds and sunshine, and the more buoyant spirits of the troops, combined to induce increased military activity, but the melting of the snows caused floods in many of the rivers, especially in Alsace.

In the late winter the snow was 8—10 feet deep on the upper ranges of the Vosges, and heavy snowstorms frequently brought military operations to a standstill. Snow forts were built, and the batteries were so effectively hidden in snow-banks as to be invisible even from aeroplanes. In the early spring thaws the mountain streams became raging torrents and operations were suspended.

The small number of Zeppelin raids during the winter, in spite of several calm spells, suggested the probability that the Germans were waiting for more settled weather before making more serious ventures. It was, therefore, not surprising to note the greatly increased activity in aerial warfare as spring came on (early April). Since then almost daily air raids of one sort or another, have occurred. The record of the flying corps in Flanders is remarkable. From August to early February, only six days in the air were missed. Significant, also, is the fact that every important German air raid during the winter occurred at the time of a fog, apparently accurately forecasted by the German meteorological war service.

In the Dardanelles naval operations were begun in fine weather, as was to be expected; but later on storms frequently interfered with the Allies' naval attacks, and with their seaplane reconnaissances, giving the Turks opportunity to repair damage, and to mount fresh guns. The storms which have caused the trouble belong to a type most common in spring, crossing central Italy and the Adriatic and moving thence east or northeast. The delay in the Dardanelles is of far less consequence since the breaking up of the ice at Archangel. With that northern port open again, war munitions and other supplies may be shipped to Russia, and Russian wheat can find an outlet.

A new and curious emphasis upon the importance of weather controls in modern warfare comes in the report that the wind which, on one occasion, had been carrying the deadly asphyxiating gases used by the Germans towards the Allies' trenches, suddenly changed, blowing these same gases back to the German lines, and forcing the men to flee for their lives. Another interesting item is found in the opinion of an English copper expert that, owing to the mud and water in which so much fighting has taken place, probably not 5 per cent of the cartridges used have been recovered for remelting. Mud and water may thus play a part in hastening the end of the war. The use of white woolen caps, white uniforms, and white sheets put over the uniforms, in order to make the troops less conspicuous against the snow, is also worthy of note. For the same reason some of the horses even have been painted white.

Cambridge, Mass., May 8, 1915.

SUMMER COURSES IN GEOGRAPHY

By F. E. Williams
University of Wisconsin, Madison

THE following list is incomplete. An effort was made to secure information from all of the larger universities and many of the smaller ones. In some instances our inquiries brought no replies and in others only "preliminary announcements" had been issued; these do not, as a rule, give details regarding courses. Many normal schools also give summer courses in geography.

University of California, Berkeley

Commerce of the Pacific, Mr. Wright.

Field Physiography, Saturday excursions, Associate Professor Holway.

Physiography of California, Associate Professor Holway.

Physical Geography in the High School, Mr. Wright.

University of Chicago

Teachers' Course in Geography, Miss Lanier.

Economic and Commercial Geography, First Term, Miss Lanier; Second Term, Dr. Jones.

Elementary Field Course, Four weeks in southwestern Wisconsin, commencing June 21, Dr. Jones.

Field Course; The Environs of Chicago, Second Term, Dr. Jones.

The Elements of Meteorology, Mr. Reed.

Geography of Europe, Associate Professor Goode.

The Climate of North America, Mr. Reed.

Influence of Geography on American History, Professor Barrows and Miss Lanier.

Economic Geography of the United States, Associate Professor Goode.

Conservation of Natural Resources, Professor Barrows.

Geographic Influences in the History of the Western States, Professor Barrows.

Field Geography, Parts of Colorado, Utah, Nevada, and California, September 3rd to October 2, Associate Professor Goode.

The School of Education of Chicago University offers courses in:

Geography in the Primary Grades, Associate Professor Baber.

Geography in the Grammar Grades, Associate Professor Baber.

Geography in the High School, Professor Salisbury and Associate Professor Baber.

University of Colorado, Boulder

Principles of Earth Science, Associate Professor McCourt.

Economic Geography, Associate Professor McCourt.

Teachers' Course in Geography, Associate Professor McCourt.

General Principles of Anthropo-Geography, Miss Semple.

Geography of the Mediterranean Basin, Miss Semple.

COLUMBIA UNIVERSITY, NEW YORK, N. Y.

Physical Geography and its Economic Aspects, Professor McFarlane and Miss Hatch.

Physiography of the Eastern United States, Professor D. W. Johnson.

Physical Geography and Physiography of the Western United States, Field Work in Western part of the United States, Professor D. W. Johnson.

Commercial Geography, Professor McFarlane and Miss Hatch.

The Teachers' College of Columbia University offers courses in:

The Teaching of Geography in the Lower Grades, Miss Kirchwey.

The Teaching of Geography in the Upper Grades, Miss Kirchwey.

The Teaching of Regional Geography in the Junior High School, Miss Kirchwey.

General Geography for Elementary Schools, Miss Kirchwey.

Human Geography in Elementary Schools, Professor Dodge.

CORNELL UNIVERSITY, ITHACA, N. Y.

Round Table Conferences in Geography and Geology, Professor Carney.

Physical Geography, Assistant Professor von Engeln.

Industrial Geography, Professor Carney.

Geography of North America, Assistant Professor von Engeln.

Teachers' Course in Geography, Professor Carney.

Geography and Geology, Field Course, Assistant Professor von Engeln.

DENISON UNIVERSITY, GRANVILLE, OHIO

Geography for Grammar Grades, North America, Miss Henderson.

Geography for Primary Grades, Miss Henderson.

Nature Study in the Grades, Miss Henderson.

GEORGE PEABODY COLLEGE FOR TEACHERS, NASHVILLE, TENN.

Principles of Geography, Mr. Ward and Miss Dopp.

Commercial Geography, Mr. Ward.

Commercial and Industrial Geography of Latin-America, Mr. Osuna.

Geography of North America, Mr. Ward.

Influence of Geography on American History, Miss Dopp.

UNIVERSITY OF KANSAS, LAWRENCE

Physiography, Professor Haworth.

UNIVERSITY OF MICHIGAN, ANN ARBOR

Teachers' Course in Physiography, Assistant Professor Scott.

THE UNIVERSITY OF MINNESOTA, MINNEAPOLIS

General Geography, Mr. Posey.

Physiography, Mr. Posey.

Field Course in Geography. Three separate tours in the western part of the United States, Mr. Lehnerts.

THE UNIVERSITY OF MISSOURI, COLUMBIA

Teachers' Geography, Mr. Parkins.
Fundamentals of Physical and Human Geography, Mr. Parkins.
Geographic Literature, A reading course, Mr. Parkins.

UNIVERSITY OF NEBRASKA, LINCOLN

Physical Geography, Miss Nelson.
Industrial Geography, Miss Nelson.

UNIVERSITY OF NORTH DAKOTA, GRAND FORKS

The summer courses in Geology and Physiography are given at Devil's Lake.

Physiography, Assistant Professor Simpson.
Field Geology and Physiography, Assistant Professor Simpson.

OHIO UNIVERSITY, ATHENS

Physiography, Professor Thompson.
Political Geography, Professor Thompson.
Methods in Geography, Professor Martzolff.

SUMMER SCHOOL OF THE SOUTH, KNOXVILLE, TENN.

Elementary Geography, Professor Merrill.
Industrial Geography, Professor Merrill.
Physical Geography, Professor Merrill.

UNIVERSITY OF VIRGINIA, CHARLOTTESVILLE

Physical Geography, Miss Kelley.
Industrial Geography, Professor Hughes.
Aims and Methods in Geography, Miss Kelley.
Review of Grammar School Geography, Professor Hughes.
Course in Constructive Illustration, Professor Hughes.

UNIVERSITY OF WASHINGTON, SEATTLE

Industrial and Commercial Geography, Professor Gregory.
Physical and Regional Geography, Professor Gregory.

UNIVERSITY OF WISCONSIN, MADISON

Commercial and Industrial Geography, Associate Professor Whitbeck.
Physical and Applied Geography, Associate Professor Whitbeck.
Geography of Europe, Mr. Williams.
Influence of Geography on American History, Mr. Williams.
Advanced Geography, Associate Professor Whitbeck.
Summer Field Course in Physiography and Geology, four weeks in August beginning after close of summer session, Mr. Williams.

RECENT PUBLICATIONS

GEOGRAPHIC INFLUENCES IN OLD TESTAMENT MASTERPIECES. By Laura H. Wild. Ginn and Co. 1915. 182 pages. $1.00.

Miss Wild is a professor of Biblical History and Literature in Lake Erie College. She says regarding the purpose of her book: "It is to give illustrations of how Old Testament literature is interpreted through the geography, history, botany, and zoology of the land in which it was written." In the attainment of this purpose the author is more than ordinarily successful. She is moderate in her claims regarding the effect of geographical influences upon the Hebrew people and their institutions. Illustrations are drawn mainly from the Old Testament poems whose figures of speech so well reflect the influence of environment upon the methods of thought and expression. Miss Wild collects and groups under appropriate heads the many examples of the influence which the desert, the pastoral life, the precarious agriculture, the cultivation of the vine, and the contrasts of plain and mountain exerted upon the life of the people. The book is a worthy effort and well done. It adds one more to the growing collection of interpretative geographical studies and it is sure to lead to others.

ECONOMIC GEOGRAPHY. By John McFarlane. viii. 560 pp. The Macmillan Company, 1914. $2.25.

The author is a lecturer in Geography in the University of Manchester, England, and the book is English in its general style of makeup. There are no half-tone plates, no colored maps, no diagrams and only a few sketch maps. No black-face type sets off the topics of paragraphs and there are very few tables of statistics. Yet the book has a number of strong features. The distribution of space among the countries treated is well balanced and would not be at all badly suited to American requirements; for example, the United Kingdom is given 38 pages, Germany 26, Japan 11, Canada 24, Mexico 5, and the United States 36.

Only three chapters are given to preliminary discussions (1) Physical Conditions of Economic Activity, (2) Climate, (3) Vegetation, and each of the remaining 44 chapters is devoted to a country or to a region (e. g. Central America, West Africa). The book gives more than usual consideration to geographical influences; countries are subdivided and their different physiographic or climatic provinces are treated as natural units: for example, France is subdivided into the following provinces: (1) the central massif, (2) the Armorican massif, (3) Aquitaine, (4) the Mediterranean region and the Rhone Valley, (5) the Alpine zone, (6) the Eastern border, (7) the Basin of Paris. In addition, certain topics—communications, waterways, commerce—which belong to the country as a whole are treated. This method of treatment is in our judgment the correct one for an Economic Geography. Though countries are not usually natural geographic units, yet they are the proper units for treatment in economic geography.

The book is well written and gives the impression of thorough reliability. Its content is admirable. Its shortcomings (to an American) are those mentioned in the beginning.

THE PANAMA CANAL AND INTERNATIONAL TRADE COMPETITION. By Lincoln Hutchinson, University of California. X+283 pages. The Macmillan Co., New York, 1915.

A careful study and a clear presentation of a topic which has much interest at the present time. The author has studied the trade routes of the last ten or fifteen years to show what the trend of development has been. Then the new factor, the canal, has been introduced and an attempt made to show how it may alter the direction or character of trade movement. The author has made a comprehensive study of statistics of all countries which publish such data and has added valuable personal observations based on a series of visits to all important regions concerned.

The discussion is largely of an economic nature but there is much of value for the geographer in this volume. F. E. W.

THE CHILD'S INTEREST IN GEOGRAPHY

IN *American Education* for February, 1915, Dr. George J. Dann, Superintendent of Schools, Oneonta, N. Y., discusses the above topic. He asks: "Are not the interests of the children themselves the key to the solution of this problem of procedure in teaching geography?"

Dr. Dann proceeded to investigate this question in the grades of the Oneonta schools. With the cooperation of his teachers he made a series of tests of various sorts under conditions which were likely to reveal the actual geographical interests of pupils of different ages.

"A preliminary effort was made to have the children in every grade investigated, instructed in each of the following departments of the subject:

(a) The human phase
(b) Maps and map drawing
(c) The industrial phase
(d) The physical phase
(e) The wonderful and curious
(f) Beautiful scenery
(g) The mathematical phase
(h) Animal life
(i) Plant life
(j) The commercial phase
(k) Historic places."

* * * "For several days before each test was made the instructors were cautioned to put aside all personal preferences and to strive to put the children in possession of sufficient geographical data relating to each of these phases to make them capable of intelligent choice." * * * "The most marked

interest of fourth grade boys was in the human phase—in peoples, particularly those whose customs, dress and manners are far different from our own."

In the fifth and sixth grades he found that the interest of boys in the human phase was even more notable than in the preceding year and he summarizes by saying: "Our results were of such a nature as fairly to establish the fact that the interests in people, their habits, customs, and dress is strong and persistent in all of the grades of the elementary school."

"Our study of interest in the industries was one of the most satisfactory features in this investigation. Beginning with a scant comprehension of the value of the study of industries in the fourth grade, the interest increases steadily in importance from year to year."

* * * "Interest in commerce seemed to develop more slowly than interest in industry. No evidence of any importance of a desire to know more of this topic was to be found in the fourth or fifth grades."

"Interest in *relief*, drainage, climate, etc., was everywhere meagre until the eighth grade. Even then it was not predominant. Causal relations do not appeal to young children in the field of physical geography to any greater extent than they do elsewhere. Physical geography is probably better taught to eighth year and high school pupils."

"This investigation seems to confirm the present tendency of pedagogical thinking as related to children's interests in mathematical geography. Although "type questions," suggestive of a rich content, were brought to the attention of hundreds of children, no interest of any importance was in evidence until the child had reached the upper grammar school grade. It is fully understood that there are other factors besides interest which must be taken into consideration. I do feel convinced, however, that interest has not been sufficiently considered by those who have prepared courses, and syllabi and text books. Interest is primarily a feeling and feelings are rarely neutral. If we can make an ally of interest in our geography work, we shall have the right to expect more satisfactory results than we have secured so many times in the past when we have found interest battling against us."

The Journal of Geography believes that Supt. Dann's conclusions are essentially correct.

PROFESSOR DAVIS'S REPORT ON HIS STUDY OF CORAL REEFS

IN *Science* of March 26, Professor W. M. Davis gives a preliminary report on the SHALER MEMORIAL study of coral reefs. He announces that the full report will probably appear in the *Bulletin of the Museum of Comparative Zoology* at Harvard College. Excerpts from his preliminary report follow:

"Any one of the eight or nine theories of coral reefs will satisfactorily account for the visible features of sea-level reefs themselves, provided the postu-

lated conditions and processes of the invisible past are accepted; hence a study of the visible features of the reefs alone can not lead to any valid conclusion."

"The testimony of the first group of witnesses—the central islands of barrier reefs—convinced me that Darwin's theory of subsidence is the only theory competent to explain not only the development of barrier reefs from fringing reefs, but also the shore-line features of the central (volcanic) islands within such reefs; for the embayment of the central islands testifies emphatically to subsidence, as Dana long ago pointed out; thus my results in the study of this old problem of the Pacific agree with those of several other recent students. Darwin's theory of subsidence also gives by far the most probable explanation of atolls."

"The testimony of the second group of witnesses—massive elevated reefs such as occur on certain Fiji Islands—convinced me that Darwin's theory of subsidence gives the only satisfactory explanation of the origin of such reefs also; for their limestones rest unconformably on the normally eroded surface of a preexistent foundation."

"All the still-stand theories of barrier reefs—that is, all the theories which involve a fixed relation of the reef foundation to the sea level during the formation of the reef mass—are excluded by evidence of submergence found in the embayed shore lines of the central islands within barrier reefs."

"The glacial-control theory proves incompetent to explain barrier reefs, and it is therefore held to be generally incompetent to explain atolls also."

"No absolute demonstration of the origin of coral reefs, or, for that matter, of any other geological structure, is possible; the most that can be hoped for is a highly probable conclusion. The conclusions announced above in favor of Darwin's theory are believed to have about the same order of probability as that usually accepted as 'proof' in geological discussions."

"The Great Barrier reef of Australia, the largest reef in the world, with a length of some 1,200 miles and a lagoon from 15 to 70 or more miles wide, has grown upward during the recent subsidence by which the Queensland coast has, after a long period of still-stand, been elaborately embayed."

HUMAN GEOGRAPHY

"I would confine geography to what is now called human geography, keeping always in mind the reaction of man on his environment as well as the converse, and I would extend its boundaries only in the direction of social geography, which is a study scarcely touched so far, but one that must of a certainty follow."

"It is sometimes argued that the environmental influences acting on man are too complex and too involved to admit of analysis and estimation, and that in consequence the problems of the geographer are insoluble. There can be no denying the complexity of the material to be studied, but surely this is exactly why its study entails the most rigorous of scientific methods. That is what makes geography a subject for advanced and not elementary students.

But surely the difficulties of the problems that face the geographer do not warrant their abandonment. In fact, by very reason of this complexity, there is no study which to such an extent as geography frees the mind from narrowness."

"There can, of course, be no finality in the conclusions of the geographer. The world is changing of itself and by our actions, and we are changing too. A given set of physical circumstances, even though they could remain unchanged from one generation to another, would affect man differently in those successive periods, because he himself had changed, and his value towards his conditions is not the same in the two generations. We can therefore only arrive at the nature of the relationships between man and his environment at a given time, and their tendencies and directions of change. I doubt how far the quantitative value of geographical controls can be estimated with any degree of precision. But this quantitative estimate is of the greatest importance. When the value of such interpretation is realized, the geographer's valuation and forecast will commend themselves to men of affairs and statesmen."—[R. N. R. Brown in *Scot. Geog. Mag.* Sept., 1914].

EXAMINATION IN GEOGRAPHY, STATE OF NEW JERSEY

State Examination for Pupils of the Highest Elementary Grade, June 4, 1914.

PART I.

The pupil or teacher will select nine questions from Part I. Each question counts 10 *points.*

1. (a) Name *two* canals in New Jersey. (b) Name *two* counties through which *each* passes. (c) Name *two* important cities or towns near or through which *each* passes.

2. (a) Name *five* states that lie north and east of New Jersey.

(b) Name *four* states that lie between New Jersey and the Mississippi river.

(c) What state occupies the northwest corner of our country?

3. (a) Name *five* important seaports on the Atlantic coast and the state in which each is located.

(b) Name *three* important cities on the Great Lakes and *two* on the Gulf of Mexico and the state in which each is located.

4. (a) Select *five* of the following and state from which of our "possessions" outside of the boundaries of the United States each is obtained in large quantities: seal fur, sugar, tobacco, pineapples, gold, coffee.

(b) Write a short paragraph explaining what the United States is doing to help make its "foreign possessions" prosperous. Refer to the government, education and industries.

5. Name a state in which each of *five* of the following industries is important: hard coal mining; foreign commerce; silk weaving; sheep raising; cotton weaving; iron manufacturing; granite quarrying; soft wood lumbering.

6. What and where are five of the following: Quebec, Vancouver, Halifax, New Foundland, Honduras, Lower California, Puget, Sault St. Marie?

7. (a) Name *five* cities of South America and state the country in which each is located.

(b) Write a paragraph on *one* of these five cities which will show why it is interesting or important.

8. (a) Name an important city in each of *ten* of the following countries, and (b) tell for what each is important: Portugal, Spain, Holland, Greece, Italy, Belgium, Russia, Denmark, Norway, Germany, Turkey, Austria, England, Switzerland, Sweden.

9. Write a paragraph on *one* of the following topics. Think carefully before writing, that your paragraph may show that you have made a study of the topic.

(a) Governments of Europe.

(b) Five cathedrals of Europe.

(c) The glaciers of Switzerland.

10. (a) Name *five* exports from Asia.

(b) Write a paragraph on one of the following: Siberia, Thibet, the recent awakening of China.

11. (a) Name *five* cities of Africa.

(b) Write a paragraph on *one* of the following: The control of European nations in Africa, "the Cape to Cario" railroad, climate of Africa.

12. (a) Name *five* foreign seaports with which New York is connected by lines of steamers.

(b) Name *one* article that is likely to be sent from each of these foreign ports to New York.

PART II.

Each pupil or the teacher will select one of the following questions.

13. (a) On the outline map of New Jersey indicate five of the following: Newark; Bayonne; Passaic river; Sandy Hook; a mining region; an oyster growing section; the region of pines; Camden; Atlantic City; Cape May.

(b) Write a paragraph on the natural resources of New Jersey. In your paragraph consider at least five such natural sources of wealth.

14. (a) On the Mercator Projection map (the large outline map) write in their proper places *ten* of the following: Australia; Suez Canal; Gulf of St. Lawrence; Ireland; Baltic Sea; Cuba; Cape of Good Hope; Siam; Carribean Sea; Andes Mountains; Tropic of Cancer; Russia; Indian Ocean; New Jersey; Great Lakes.

(b) Write *two* short paragraphs on winds—(1) their causes and (2) effects.

15. (a) Using the hemisphere outline maps, place figures indicating the correct position of the following locations:

(1) latitude 0° longitude 90°W.
(2) latitude 52°S. longitude 70°W.
(3) latitude 66—2/3°N. longitude 20°W.
(4) latitude 23½°N. longitude 90°E.
(5) latitude 39°S. longitude 148°E.
(b) Explain the difference between the terms "up" and "north."

A BALKAN STATESMAN'S PREDICTION ABOUT THE WAR

WE can say with certainty that the Russians and their allies have the best of it, and that this terrible struggle will end in defeat of Germany and Austria-Hungary.

And what will be the result? The outcome of the present war may be conceived thus:

First: Russia will expand at the expense of Austria-Hungary, will annex Galicia, and will demand from Turkey the occupation of Constantinople and a part of Asia Minor.

Second: France will regain her two former provinces of Alsace and Lorraine.

Third: England will be benefitted by gaining possession of the German colonies, as well as a part of Asia Minor.

Fourth: Belgium will receive as recompense for her stoic resistance the Duchy of Luxemburg.

Fifth: The two kindred kingdoms of Servia and Montenegro will receive as a reward for a struggle not less stoical, the two Austrian provinces peopled by the Serb race.

Sixth: Italy as a reward for her neutrality would receive the provinces of Austria-Hungary inhabited by Italians.

Seventh: Roumania for the same reason would receive Bukovina, an Austrian province peopled largely by Rumanians.

As to Turkey, which has been dragged into the war by German political intrigue, she will be erased from the map as an independent country. It will be the same with Albania; for her inhabitants, who are in a state of perpetual anarchy, cannot long exist as an independent people.

This, then, is my view of the conditions that will be imposed upon the conquered. Perhaps changes may be even greater; for it is possible that Austria-Hungary, like Turkey, may cease to exist as an independent empire. Nor is it inconceivable that certain provinces might be snatched from Germany, as for example German Poland. But here you have in a few words my opinion of the actual situation now existing in Europe, and my predictions for the future.—From "Europe—After the War," by Dr. Ivan Yovitchevitch, in the *American Review of Reviews* for March.

THE WONDERFUL GROWTH OF THE UNITED STATES

IN the half century since the close of the Civil War (1864 to 1914), the United States has been passing through a period of growth such as no nation in the world's history ever experienced.

FROM 1864 TO 1914

The population increased from 34 to 98 million.
The per capita wealth from $500 to $1500.
The per capita circulation of money from $20 to $35.
The number of national banks from 467 to 7500.
Individual savings bank deposits from 240 to 4800 million dollars.
Imports of merchandise per capita from $9 to $19.
Exports of merchandise from 160 to 2360 million dollars.
Exports of merchandise per capita from $4.70 to $24.00.
Exports of leather and its manufactures from 2 to 58 million dollars.
Exports of oil, mineral and refined, from 7 to 145 million dollars.
Exports of wood manufactures from 12 to 100 million dollars.
Exports of all manufactured articles from 35 to 1100 million dollars.
The value of farms and farm property from 8 to 40 billion dollars.
The annual value of farm products from 2 to 9 billion dollars.
The value of farm animals from 1 to 6 billion dollars.
The wheat grown from 160 to 890 million bushels.
The corn grown from 800 to 3,000 million bushels.
The cotton grown (1866-1913) from 2 to 14 million bales.
The rice grown (1866-1913) from 25 to 700 million pounds.
The cane sugar made (1870-1914) 100 to 600 million pounds.
The copper mined from 8000 to 550,000 long tons.
The coal mined from 21 to 500 million long tons.
The petroleum obtained from 88 to 10,500 million gallons.
The pig iron produced from 1 to 31 million long tons.
The steel from 15,000 to 30,000,000 long tons.
The value of manufactured products from 2 to 20 billion dollars.
Cotton spindles from 6 to 32 millions.
Cotton spindles in the South from a half million in 1880 to 12 million in 1913.
Imports of raw silk from 400,000 to 35,000,000 pounds.
The per capita consumption of sugar from 18 to 87 pounds.
The per capita consumption of coffee from 3 to 10 pounds.
The railroad mileage from 34,000 to 260,000 miles.
The postal receipts from 12 to 270 million dollars. R. H. W.

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...onthly Magazine Devoted to the Interests of Teachers of Geography
in Elementary, Secondary, and Normal Schools.

...UGHES WHITBECK, *Editor* LAWRENCE MARTIN, *Associate Editor*
Of the Department of Geology and Geography of the University of Wisconsin

...E XIII SEPTEMBER 1914 NUMBER 1

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THE JOURNAL OF GEOGRAPHY 15c a Copy
V. C. FINCH, Business Manager
University of Wisconsin, Madison, Wis.
...ered at the Post Office, Madison, Wis., as Second Class Mail Matter Sept. 9, 1910

The Journal of Geography

Published Monthly except July and August

Successor to the Journal of School Geography, Vol. V, and the Bulletin of the American Bureau of Geography, Vol. II.

Editor
RAY HUGHES WHITBECK.

Associate Editor
LAWRENCE MARTIN.

Of the Department of Geology and Geography, University of Wisconsin

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PRICE—The subscription price is one dollar a year, payable in advance. Fifteen cents a copy.

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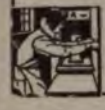

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VOLUME XIII JUNE 1915 NUMBER 10

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Entered at the Post Office, Madison, Wis., as Second Class Mail Matter Sept. 9, 1910

Oxford University Press JUN 8 1915 LIBRARY

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Published Monthly except July and August

Successor to the Journal of School Geography, Vol. V, and the Bulletin of the American Bureau of Geography, Vol. II.

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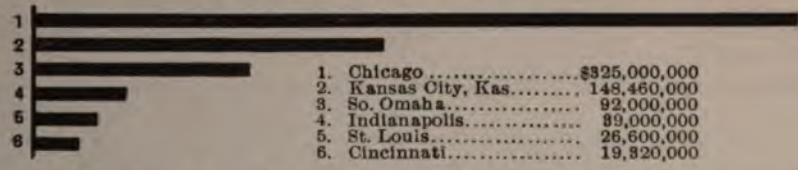

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